Critical Realism: An Alternative Perspective on Evaluation Methodology

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Declaration

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree.

The work presented (including data generation and data analysis) was carried out by the author, except where acknowledged by citation to an existing publication mentioned in the list of references.

Abstract

The aim of this research was to explore the contribution of critical realist metatheory to evaluation. The principal contention is that adopting a critical relist perspective overcomes the propensity of conventional approaches to evaluation, both quantitative and qualitative, to focus on pre-determined performance measurement criteria.

This research is based on comparative analysis of the methodologies and outcomes derived from conventional and critical realist evaluation. Evaluation grounded in critical realist metatheory embraces methodological pluralism, which underpins critical realism, and emphasises more thoughtful forms of data interpretation in empirical research. Making use of an exemplar, publicly funded, scheme providing grants to enterprises engaged in commercialising innovation, the research examines the role of common forms of data gathering and analysis, contrasted with particular forms of data interpretation based on abduction and retroduction. Intrinsic and extrinsic research methodologies are presented, not as polar opposites, but as complementary stances in gaining a rounded understanding of the scheme.

Conventional approaches to evaluation are shown to act as limited forms of performance measurement, emphasising anticipated outcomes and predetermined criteria but offering little explanation and understanding. Critical realist evaluation is shown to broaden the scope of outcomes identified and deepen explanation and understanding, whilst simultaneously acknowledging the implications of fallibilism in developing multiple, plausible explanations. Explanation is enhanced through recognition of the inherent uncertainty of the social world, despite the dominance of notions of universal regularities. Recommendations for undertaking evaluation are given.

The research helps fill an identifiable gap in current literature and debate on mechanisms and casual inference in social science. It provides a practical example of evaluation in the context of support interventions for innovation. No equivalent example is known to have been published previously.

1.0 - Introduction

Evaluation is a generic activity that embraces judging outcomes, assessing actions and behaviour, and identifying the factors influencing an activity. Although evaluation takes place in many different contexts and addresses many different activities and dimensions of human behaviour, this thesis considers evaluation in the context of social programmes (education, health care, criminal behaviour, business support, and so on), associated interventions, and policies. It has a particular focus on programmes and interventions resourced by the Public Sector in the UK with the intention of supporting innovation. Evaluation is a versatile activity and can target policies, outcomes, and processes in collections or groups of programmes, individual programmes, and particular components within programmes. Whilst there may be similarities, it is likely that the actual approach adopted will be contextualised to the specific target and scale of activities being evaluated. Often, evaluation activity will entail comparative assessment of actual performance or operation against a set of predetermined aims, objectives, or standards with the aim of supporting informed decision-making.

There are close relationships between alternative forms of evaluation and research philosophies and methodologies with a number of different styles of evaluation drawing explicitly on established research practices to address specific evaluation questions and/or requirements. Hence, the development of alternative approaches to evaluation has often progressed in association with the development, application, and enhanced understanding of complimentary research philosophies, activities, and methodologies. The legacy for those engaged in evaluation is a plethora of approaches to evaluation and associated research methodologies. Approaches developed early in the history of evaluation tended to have a comparatively narrow focus concentrating on performance measurement, such as comparing actual to intended outcomes. Later developments recognised a wider range of issues and,

whilst often still focusing upon a relatively narrow range of issues, specific approaches focused on aspects such as the political dimensions of evaluation or stakeholder participation. The most contemporary approaches tend towards using mixed-method research to provide data and information that can be used to evaluate the wider range of issues and provide alternative perspectives on multiple issues.

None of the range of approaches is necessarily mutually exclusive, and instead they must often be applied in bespoke configurations to serve the specific needs of clients or stakeholders that can range from simple, straightforward assessment of merit, value, or worth to more complex and sophisticated understanding and explanation of activities, operations, and outcomes. The linking theme is that evaluation, in whatever form and drawing upon whatever research philosophy and research methodologies, should provide information which assists decision-makers who may range from potential customers needing basic product or service evaluation to operators, managers, designers, and owners of processes and schemes seeking to enhance effectiveness and efficiency.

This research contributes to the progressive development of approaches to evaluation by exploring whether, and if so, how, a critical realist approach to research, grounded in its central tenet of methodological pluralism, working in harmony with the range of alternative approaches to evaluation developed to date, and building upon the foundation that these provide, might contribute to the effective utilisation of evaluation, as advocated by Weiss (1998a, p.30).

The implicit ‘problem’ underpinning this research is that evaluation, as traditionally undertaken, offers only limited insight into plausible explanations of the mechanisms and relationships that underpin the operation, and give rise to the outcomes of the programme or intervention being evaluated. The assertion embedded within this

research is that critical realist metatheory is extremely significant in evaluation, not by standing in isolation as a single, unique approach, but by becoming integrated within a multi-faceted, mixed mode empirical methodology embracing pluralistic perspectives and multiple stakeholders in evaluation. It adds value by providing new insights, especially on causality and in terms of enhanced explanation, when compared to other approaches to research on which evaluation may be based. The central contention within this research is that critical realist metatheory enhances understanding of the focal activity under evaluation by deepening appreciation of the effect of causal influences, thereby creating conditions in which it is possible to improve effectiveness and efficiency within the focal activity. The significance of this research is that it illustrates the "…*distinct*[ive] *empirical edge…"* (Edwards *et al.,* 2014, p.318) of critical realist metatheory applied in a specific context.

This research contributes to the exploration of mechanisms and causal inference in social science. Its principal focus concerns empirical research that seeks to understand and explain specific, observable outcomes (Mahoney, 2003, p.1) based upon an organisational, micro-social perspective that retains an underlying philosophy of generative social science. The researcher assumed that the overriding purpose of research and theory in social sciences is explanation, not prediction, accompanied by the drive to control influencing elements (Manicas, 2006). Explanation necessarily requires an appreciation of the mechanisms and processes that give rise to collaboratively created outcomes contingent upon the behaviour enacted by disparate actors interfacing in a given context. Mechanisms are considered generative, although it would be misleading to assume that generative mechanisms are necessarily ampliative, since some are inherently constraining.

A literature review covering evaluation and critical realism in social science identified two principal strands of research and publication: firstly, evaluation in social policy,

with a broad perspective of societal responses to social needs; secondly, the relationship between critical realism and evaluation methodology, typically applied to a specific aspect of social policy, such as health care. The original contribution made to extant knowledge concerns evaluation guided by critical realist metatheory in the context of supporting innovation. It has two principal aspects:-

a) Extending current interest in critical realist evaluation by explicitly demonstrating how critical realist evaluation differs from other approaches to evaluation;
b) Providing an empirical example of the influence of critical realist metatheory on evaluation processes by undertaking analysis of a specific support intervention for innovation. None is known to have been previously undertaken in this context, and no directly comparable extant literature has been identified.

The core aspects of a critical realist perspective are: firstly, Bhaskar's (2008, p.56) principle of ontological depth, which asserts that reality is divided into different, but inter-related, domains and strata; secondly, given that causal mechanisms cannot be detected directly but are the root causes of all experiences, it is not possible to attribute definitive cause and effect relationships. This even applies to two events co-located so as to infer some form of immediate, lagged, or indirect causal association. Explanation is at best partial, even if apparently reliable, because knowledge of influencing interactions and constraining conditions is always incomplete and the process through which cause influences effect cannot be determined with certainty (Elder-Vass, 2004, p.12-14). Thirdly, a critical realist perspective seeks to explain causal influences through the principles of abduction or retroduction. These are processes of ampliative inference that begin with observed or detected experience and which then seek to postulate the conditions that must be present in the real domain and actual / events stratum in order to give rise to the outcomes observed or detected. Fourthly, plausible causal influence remains

uncertain when considered in the light of conventional research evaluation criteria such as reliability, universal regularity, validity, and repeatability.

1.1 - Research Scope, Questions, Aims, and Objectives

The scope of this research embraced firstly, assessing the potential contribution of critical realist metatheory to the evaluation of a support intervention for innovation in smaller enterprises, and secondly, indicating the potential for extending evaluation from judgement of value to explanation and understanding of factors influencing outcomes.

It sought answers to the following principal research question:
How does the adoption of a critical realist perspective enhance methodologies for the evaluation of support for innovation in smaller enterprises?

In exploring the issues raised the researcher established the following aims and objectives:

1. To compare and contrast the conceptual foundation of evaluation centred upon the objectivist-subjectivist ontological dichotomy with evaluation based upon the principle of ontological depth.
2. To compare and contrast the methodology, or methodologies, that may be applied in undertaking evaluation adopting a critical realist perspective with methodologies advocated in alternative forms of evaluation.
3. To identify and explain the additional broader and deeper evaluation outcomes not revealed in an alternative form of evaluation, which become accessible only when adopting a critical realist perspective.
4. To demonstrate the role of research techniques and methodology when applying critical realist metatheory in evaluation.

1.2 - General Approach

The overall approach to the research was empirical, building upon three key issues. Firstly, a specific exemplar was selected to explore the capability of critical realist metatheory to extend evaluation of innovation support in order to enhance understanding and explanation. This was the publicly resourced Advantage Proof of Concept Fund (APoC), which operated in the West Midlands from 6th October 2008 to 31st March 2010. The scheme awarded capital grants on a selective basis at a very early stage in the commercialisation process, before commercial providers of funds were willing to invest. The grant covered external third-party costs for proof of concept activity, to assess commercial potential prior to launching new products, services, or processes.

Recipients were required to contribute a minimum of 25% of the projected project cost, the grant providing the remaining 75%, up to a maximum of £30,000. Five broad categories of qualifying activity were designated and the grant was paid retrospectively, upon proof of expenditure to a third party: no internal costs were covered by the grant. The scheme generated 907 enquiries leading to 240 grant awards, 20 being either withdrawn or not taken up[1]. It closed earlier than expected, due to a change in Government and grant awards were only made up until 31st March 2010. All funds were to be drawn down by 31st December 2010 and formal closure took place on 31st March 2011, although a further twelve months of on-going monitoring took place, with the aim of completing a final conventional evaluation.

The scheme was funded by the former Regional Development Agency (Advantage West Midlands [AWM], after whom the scheme was named) and the European

[1] The figures given here are drawn from a centralised database maintained by the Managing Agent who coordinated APoC activity. As explained in sub-section 3.4.1, there are some unresolved minor discrepancies that do not impact materially upon the research but result in some inconsistencies depending upon the exact source of data stated within the thesis. References to other sections or sub-sections in this document will be given numerically.

Regional Development Fund (ERDF). Each grant was perceived as a facilitation mechanism (cause) that gave rise to particular outcomes enhancing the ability of the enterprise to benefit from developing, and ultimately launching, an innovative product, service or process in its target market. A Managing Agent was appointed, following a commercial tendering process, and developed operations, including a devolved enquiry/application handling system, supporting administrative procedures, payment of grant funds, and collection and collation of control data used for conventional evaluation. Further details are given in Section 4.0 - APOC Scheme.

Secondly, extending the existing evaluation of the APoC scheme, previously undertaken by scheme management, with the aim of discovering whether and how evaluation is deepened and broadened by adopting a critical realist perspective. The existing evaluation focused upon issues such as the number of jobs created through innovation, patent applications, access to later stage funding, and increased gross domestic product within the locale. Without denying the importance of these issues, evaluation restricted to these criteria will not help with explaining how or why any element of the scheme benefits the enterprise or community. For example, it may be relatively easy to establish that there is a correlation between firms receiving early stage funding support and numbers of patent applications. It might even be possible to show that APoC applicants achieved an above average level of patent applications, but this does not, will not, and cannot, establish a causal association to explain whether, how, or why receiving early stage funding enhances the number of patent applications made by any single enterprise.

Thirdly, applying Danermark *et al.*'s (2002, p.109-111) explanatory research framework in order to assess the practicalities of adopting critical realist metatheory in empirical research and to illustrate its possible application to evaluation.

There were three principal sources of empirical data. Firstly, a database recording details of all firms making enquiries concerning APoC. Secondly, interviews with fifteen key representatives involved in developing, and implementing the scheme. Thirdly, interviews with thirty three individuals from enterprises who had sought grants from APoC. All interviews were transcribed verbatim and analysed using NVivo 9 or NVivo 10 software.

The received wisdom, from consultation with supervisors, and experienced advisory staff within research support, was that the nature of this research did not require formal approval from the Graduate School Ethics Committee, since the data would be anonymised, except for institutions already named in documents freely available in the public domain. The researcher was advised to ensure that every enquirer was asked for permission for aggregated data compiled from their participation in APoC to be used for evaluating outcomes. Additionally, permission was sought and given for individual snippets of data, mainly quotations, to be used, subject to guaranteed anonymity. This ensured this research conformed to the University's ethical guidelines so formal approval was not requested.

Analysis of the empirical data identified 'visible outcomes' in the form experienced and expressed by the respondent that may facilitate deeper understanding of plausible explanations of the generative mechanisms, powerful particulars and operating conditions that gave rise to (caused) those outcomes. The fact that APoC officially closed in December 2010 means that all respondents had knowledge of actual outcomes at the time of interview and were, therefore, able to contrast those with prior expectations.

The need, for the researcher, was to look beyond the visible outcome to develop a plausible explanation of the outcome, in whatever form it was experienced. Empirical

data analysis was not an end in itself, but served as a facilitation mechanism, preparing the data needed to enable interpretation within critical realist metatheory. The crux of data interpretation was deriving ampliative inference from the various clues hidden within the evidence – like a Dennis Potter play there will be many clues but few answers, except those lying within the interpretation of data by the observer. Danermark *et al.*'s framework (2002, p.109-111) provided a structure for carrying out systematic interpretation, culminating in an attempt to compare different theories, abstractions and models derived. Unfortunately, the final stages of the research are limited because the scheme no longer exists and it is, therefore, not possible to seek confirmatory data.

In writing this document, the researcher is guided by the advice of Pratt (2009). Hence, the document seeks to: firstly, reflect the perspective of the subjects who voluntarily participated in the empirical analysis; secondly, present a series of claims arising from the research undertaken, supported by appropriate evidence to substantiate claims made; thirdly, to contribute towards advancing contemporary critical theory.

The principal argument, developed within the thesis, unfolds during the remaining six major sections. Section two summarises extant literature concerning the three main topics: innovation, evaluation, and critical realism before showing how critical realism may be applied as a research methodology to support evaluation activities. This includes describing and justifying the selection of a model for undertaking explanatory research based on critical realist philosophy, which provides the principal structure for conducting the research for evaluation that was undertaken for comparison purposes. Section three continues to develop the methodological stance adopted in conducting the research, including empirical data gathering, analysis, and interpretation. The section opens with an explicit statement of the research

philosophy that underpins the perspective adopted and this is followed by discussion and justification of the particular design applied. The section emphasises the specific empirical methods employed when undertaking research in a critical realist framework before closing with discussion of the particular issues associated with the principal forms of data interpretation. Section four is largely descriptive and outlines the exemplar scheme selected for exploring the comparison between evaluation undertaken by those managing the exemplar scheme and the application of a critical realist perspective to evaluation activities. Section five summarises the findings emerging from the application of the chosen model of explanatory research, including specific techniques supporting critical realist research. These include three complimentary abstractions which combine to provide plausible explanations of the mechanisms and relationships influencing the creation and operation of APoC and giving rise to the outcomes. The abstractions and comments made are justified by the evidence drawn from the finding arising from the empirical research undertaken. For clarity, this section presents findings in the strict linear sequential form outlined in the chosen model, although it is acknowledged that this does not describe accurately the actual application of the approach as undertaken by the researcher. Section six draws together the principal conclusions, emphasising the methodological contribution made through this research. It draws together the principal themes of the argument developed throughout the thesis and presents overall conclusions concerning enhanced knowledge of both the Scheme and the wider perspective of evaluation, together with conclusions concerning the methodological approach when applying critical realist philosophy and methodology to underpin evaluation. This section also summarise the key outcomes arising from the research in the context of the stated aims and objectives. The final section, section seven, considers the implications arising from the conclusions and emphasises the limitations implicit in the research methodology. The document closes by adopting the convention of

listing references supporting the citations given throughout the text and including relevant supporting material in appendices.

2.0 - Literature Review

Following definition of the scope of the research, refinement of the research question and derivation of the four associated research aims and objectives, a preliminary literature review was undertaken. The primary purpose of this section is to report the outcome of the review and to synthesise the principal themes. The methodology adopted is described, followed by an analysis of selected publications. This is followed by an outline of approaches to researching within a critical realist paradigm, before ending with a final synthesis.

2.1 - Literature Review Methodology

Initially, subject and intra-result searches using the Internet-based Web of Science journal indexing and abstract service identified publications perceived to be relevant. All the journals identified have an ISI rating and a relatively high impact factor. They are, therefore, the highest quality peer-refereed journals in the field and publish articles selected because they conform to conventional social science literature evaluation criteria (Johnson *et al.*, 2006). Searches were conducted using key terms such as ‘abduction’, ‘critical realism’, ‘critical realist’, ‘critical realist metatheory’, ‘evaluation’, ‘innovation’, and ‘retroduction’, and it was found that the spelling of the terms applied, for example, organization or organisation, made a significant difference to source identification. The literature search remained open and the review continued to be refined until July 2014, when the process of writing up the research had reached its final stages.

Progressive reduction of the sources was carried out by further searching within search results and careful re-focusing upon relevant contexts. Individual items for detailed review were then selected using published abstracts. Given the exploratory nature of the research the selection criteria favoured inclusion, since the intention

was to gain as full an understanding of exactly how key terms were being interpreted by researchers as possible.

It was recognised that Web of Science does not cover every journal publishing relevant literature. Hence, it was necessary to supplement the principal literature search method incrementally through citations and recommendations from authors of papers already selected. There is also a quantity of useful non-academic ('grey literature') produced by consulting firms and support agencies concerning the evaluation of intervention schemes. Here raw Internet searches, using the search terms previously mentioned, provided useful leads, as did personal recommendations of those already working in the field who took part in interviews (sub-section 3.4.1), but the extent and quality of peer-review for 'grey-literature' sources is unknown.

Each item selected was analysed using six aspects:-

1. Type – classification according to the style of research undertaken in terms of empiricism, review, conceptual, induction, deduction, and so on;
2. Paradigm – classification by the dominant research paradigm, for example, positivism, interpretivism, postmodernism, and so on;
3. Participants – especially important for empirical papers, but also relevant where a review or a meta-analysis is being undertaken;
4. Definition – the vocabulary used to define key terms such as critical realism, evaluation, and so on;
5. Focus – the principal theme of the research reported, which gives an indication of the thematic trends developing within the field;
6. Findings – the authors' summary of the principal outcomes of their research, which sometimes included a statement of implications.

Inductive analysis was employed to describe and explain commonalities or variations. Emphasis was placed upon the ways in which either critical realism or evaluation as constructs were modified through experience and influenced by context. *Inter alia* this facilitated comparative analysis of the perception of critical realism promulgated within mainstream social science literature and the perception promulgated within management, especially concerning evaluation conducted using quasi-realist approaches.

As the research progressed, it soon became clear that little newly published material in the area of evaluation had relevance for this research. However, academic development was continuing in critical realist metatheory and an increasing quantity of material was sourced directly from publishers, often overseas, and on-line. The field is dynamic and material continues to become available. Consequently, it did not seem appropriate to finalise the literature review until the concluding stage of editing this thesis, immediately prior to submission.

The outcomes arising from the review were divided into four broad categories: innovation; critical realism; evaluation; empirical methodology for exploring the relationship between critical realism and evaluation.

2.2 - Innovation

Support for innovation was the principal context for the empirical research underpinning this thesis. Many subdivisions within extant literature illustrate the varying aspects investigated by researchers but, since innovation support plays only a background role in this research, it is necessary to give only very brief consideration to four relevant themes:-

a) agreed or accepted definitions;

b) innovation as a process;

c) importance of innovation to business and the economy;

d) Government policy on innovation.

2.2.1 - Definitions

Innovation has been defined as: *"…the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation, or external relations."* (Tanaka *et al.*, 2005, p.46). Whilst this definition captures the general essence of innovation, nuances appear when defining principal types, such as product innovation (p.48-49), process innovation (p.49), marketing innovation (p.49-51), and organisational innovation (p.51-52). The activities explored within this research lie within the boundaries established by this definition.

An alternative definition focuses upon different levels in organisations at which innovation may occur, and the different points at which its impacts may be experienced: *'… the intentional introduction and application within a job, work team or organization of ideas, processes, products or procedures which are new to that job, work team or organization and which are designed to benefit the job, the work team or the organization.'* (West and Farr, 1990, p.9). The activities explored within this research lie within the boundaries established by these definitions.

Sears and Baba (2011, p.357) describe extant literature on innovation as *"…fragmented with little cross-fertilization and synthesis of findings…"*. They note (p.358) that extant literature lacks a perspective that seeks to integrate the variety of views, disciplines, and conceptions that all seek to explore ostensibly the same phenomenon. It is certainly clear that extant literature lacks consistency in the use of terms and agreements to adhere to accepted definitions: for example, the terms 'innovation' and 'new product development' are often used as if synonymous. From

the perspective of this research, arguably the most interesting feature in Sears and Baba's research is the perceived status of 'Government Stimuli' and 'Collaborative Initiatives' as factors influencing innovation. They infer that Government has a limited role as a facilitator of innovation, but does not appear influential in assisting creativity or motivating inventors at early stages.

Successful invention and consequent innovation depends upon contextually specific, closely coupled activities (Trott, 2008, p.23) that are combined in appropriate proportions using methods to facilitate bringing together the requirements for mutually beneficial transactions or exchanges to occur (Bernstein and Singh, 2006 and Naveh, 2005). The complexity of interrelationships within the open system that constitutes society means that others benefit from the activities required to provide the application to users; for example, sub-contractors in the supply chain (Bocquet, 2011 and Eriksson *et al.*, 2007), but occasionally, some lose; for example, manual labour displaced by automation (Vivareli, 2007).

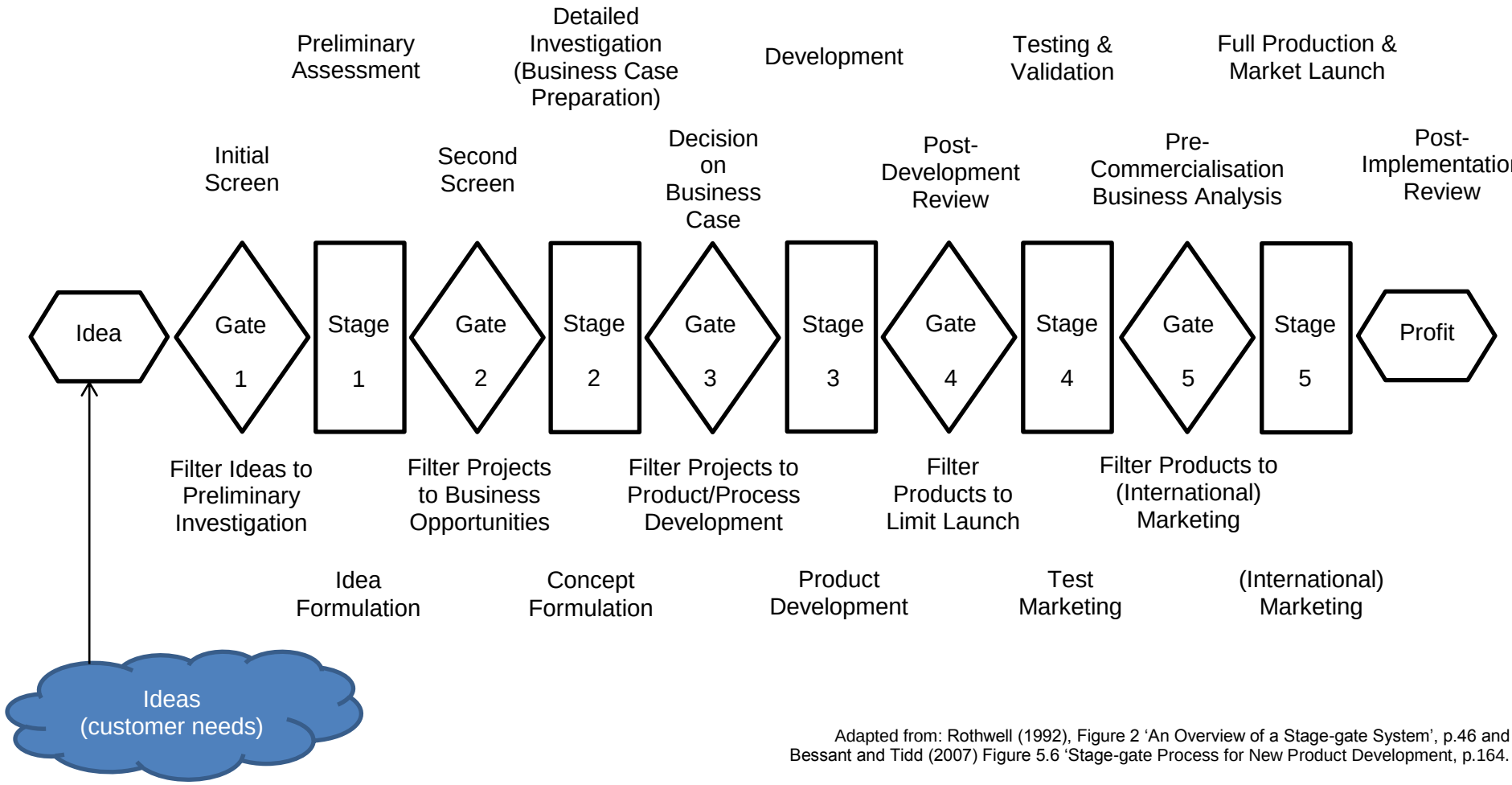
The volume and complexity of interrelationships underpinning the successful commercialisation of innovative activity infers that purposive action to create contextually specific conditions for innovation and commercialisation may be beneficial (Ortt and Duin, 2008, p.530-531). The essence of innovation management is taking purposive action and concerns management decision-making and action designed to direct and shape innovation processes to create desired outcomes for the organisation. For example, Hildago and Albors (2008) survey contemporary innovation management techniques employing knowledge management as a mechanism for enhancing firm competitiveness in knowledge-driven economies.

2.2.2 – Innovation as a Process

Innovation is often portrayed as a process (Centre for Process Innovation, 2014) that facilitates an invention (or creation or discovery) being developed to become an application serving a utility function for users. Duin *et al.* (2013, p.489-490) mirror Rothwell (1992, p.221) and trace five decades of evolution in innovation processes, from simple linear sequential practices, reliant primarily upon technological progress, to contemporary portrayals of an integrated, networking-based comprehensive model. They comment that an integrated approach is demonstrably more effective, but not necessarily the most efficient process in all situations and continue to argue for a more flexible, contextually specific perspective on innovation management. Khilji *et al.* (2006) tried to apply an integrated approach to analysing biotech companies in the USA but found that, then, contemporary literature and practice had not advanced beyond simple linear representation of innovation.

Hobday (2005, p.132-140) was extremely critical of innovation process models, citing a lack of confirmatory empirical evidence, weak theoretical foundation, and a failure to consider the uncertainty, unpredictability and diversity of innovation practice. Contemporary models pay less attention to the actual activities of innovation to emphasise a more sophisticated approach to managing the process (Bogers and West, 2012). One of the forms of linear sequential process model, developed by Cooper (1990), has endured because it focused explicitly upon new product development to the stage of commercialisation and clearly identified activities essential to successful innovation (Figure –1 – A Stage Gate Process from Idea to Commercialisation). Cooper noted (1990, p.44) that innovative companies in Western economies were neither as efficient nor as successful (effective?) as companies in the Far East and this resulted in substantial waste and lengthy delays in commercialising new product ideas. Consequently, he put forward the ‘stage-gate’

Figure 1 - A Stage-Gate Process from Idea to Commercialisation



Adapted from: Rothwell (1992), Figure 2 'An Overview of a Stage-gate System', p.46 and Bessant and Tidd (2007) Figure 5.6 'Stage-gate Process for New Product Development, p.164.

system as an operational model to guide the development of innovations that offered sustainable competitive advantage. The concept underpinning stage-gate processes is deceptively simple, but in reality the quality of the process is a function of the degree of sophistication and attention to detail given to each activity. The process itself is flexible and the model can be easily customised to the specific needs of each application. Bessant and Tidd (2007, p.164) adapted Cooper's basic framework for application in the context of a smaller firm engaged in new product development, whilst Grönlund *et al.* (2010) recently developed a form that is applicable to new product development in an open innovation context.

Cooper's model is particularly apposite in this research because of its clear focus on innovation with the aim of commercialisation and its clear identification of tasks and activities within innovative activity. This research focuses upon proof of concept activity, which is often used as a filter early in the process to select innovative ideas worthy of continuing development.

2.2.3 – Importance of Innovation to Business and the Economy

Roper *et al.* (2008) demonstrated a causal link between innovation and growth in business productivity. Ahlstrom (2010) reviewed the evidence and shows that strong enterprises not only produce profits, distributed to owners and investors or reinvested for growth; they also develop and commercialise innovations that generate economic growth and employment in the region, which, in turn, raises residents' standard of living. He goes on to argue (p.21) that society should expect business to contribute to economic growth and raised living standards, but the *quid pro quo* is the need to foster and encourage innovation and commercialisation. The innovation support initiative at the heart of this research is one example of a mechanism designed to foster and encourage innovation leading to commercialisation.

According to Rosenbusch *et al.* (2011, p.441) research on the benefit of innovation to SMEs is equivocal. They undertake a meta-analysis of 42 studies to investigate whether there is evidence to confirm the often-cited assumption that firms can gain entrepreneurial advantage through innovation. Their aggregated results show (p.452-454) that those SMEs adopting a strategic approach to innovation, in contrast to merely focusing upon new product development, benefit from engagement in innovative activity. Furthermore, the outcomes identified indicated that newer firms tended to gain most benefit and, in keeping with the strand of research demonstrating behavioural additionality, the benefits included positive impacts on innovation culture. However, their study did not open new understandings of the processes through which innovation inputs are transformed into tangible outcomes; Rosenbusch *et al.* (2001, p.452) caution against the obvious assumption that higher innovation inputs lead to greater outputs and associated benefits.

The focus upon new technology-based enterprises and the relationship between support services for innovation and commercialisation in research by Knockaert *et al.* (2013) appears particularly relevant to this thesis. In their research Knockaert *et al.* (2013, p.86) cite Heydebreck *et al.* (2000) who identified four categories of support needed to assist new technology-based enterprises: technology-related; market-related; finance-related; and soft (human/organisational) services. However, Knockaert *et al.* are critical of Heydebreck *et al.* commenting that, contrary to their assumption, new technology-based enterprises are, in fact, a heterogeneous grouping requiring contextually specific support. Consequently, Knockaert *et al.* link variations in commercialisation strategy amongst new technology-based enterprises with specific innovation support requirements.

2.2.4 – Government Policy on Innovation

Innovation and knowledge transfer are regarded as factors in economic development (Jackson *et al.*, 2013) with Galindo and Méndez-Picazo (2013) demonstrating that innovation plays a key role in economic growth when linked with entrepreneurship. Developing and exploiting the advantages of the close relationship between knowledge, skills, applications, and innovation, and between the various institutions actively engaged in combining these factors, is a central role for Government Policy on innovation (Lambooy, 2005, p.1148). Rutten and Boekema (2005, p.1132) make two significant observations. Firstly, there is a wide variety of different forms of support for innovation. Government policy in the UK in recent years has drifted away from targeted support for companies towards policies creating a more favourable environment for innovation. Secondly, for any Government, the extent to which they facilitate innovation is a function of developing an 'innovation system' supported by policy. Unfortunately, Breznitz claims (2007, p.26) most theories (not specified which theories) are not fully explained by the researchers/authors putting forward the theory and consequently, there is ambiguity in seeking to link together influences and effects emerging from intervention.

Kitson *et al.* (2004) emphasise a strong regional theme in innovation policy and research whilst Bruijn and Lagendijk (2005) stress the importance of innovation systems at a national level. In 2001, H M Treasury in the UK identified enterprise and innovation as two of five factors giving rise to regional competitiveness (Kitson *et al.*, 2004, p.995). McCann and Ortega-Argilés (2013) surveyed contemporary regional innovation policies (p.196-206) and showed that whilst there is wide acceptance of the need for focused regional support for innovation, there is a lack of consensus concerning the most effective form of interventions.

Lambooy (2005, p.1147-1148) noted the significance of regional innovation systems and the differences between the institutional and entrepreneurial varieties, as defined by Cooke *et al.* (2004, p.4-5). The former tends to be dependent upon Government support, which in turn gives rise to opportunities to create initiatives, such as the intervention that provides the context for the empirical analysis underpinning this research. Yet, as both Kitson *et al.* (2004, p.996-997) and Breznitz (2007, p.26) pointed out, there is an obvious absence of well-articulated, definitive theory to explain how the various elements identified in a wide variety of research studies create a coherent and effective foundation for effective intervention. Clearly, Breznitz's (2007) interpretation of the system's perspective on innovation focuses on macro level influences and, naturally, it is within the prevailing UK system that the innovation support intervention providing the context for this research is constituted. Additionally, wider influences, such as the impact of international and global forces upon individual enterprises and the use of ERDF monies, also influence the intervention.

Such is the perceived power of innovation to bring economic benefit that Governments and trans-national authorities believe that it is not desirable to wait for appropriate conditions to arise naturally. Instead, the prevailing assumption is that innovation should be purposefully fostered and encouraged, especially since economic gain is considered a likely outcome: "*The UK excels in research, development, and innovation, and innovative companies are an important contributor to economic growth."* (Willetts, 2013). The systems and priorities for intervention perceived to foster innovation are subject to political influence and vary with the preferences of the prevailing Government. However, whilst the detail may change, the aim remains to encourage innovative enterprises in the private sector to develop and launch innovative products and services that will create jobs and redistribute wealth (Department for Business Innovation and Skills, 2012).

2.3 - Evaluation

Evaluation is the first of two pillars supporting this research. Many types of human, social behaviour are subject to evaluation with the ultimate purpose of improvement (Pawson and Tilley, 1997, p.1- 4). The literature covering evaluation is vast, but is dominated by reports of the outcomes of a plethora of different methods of evaluation applied to a wide range of subjects (Jayawardhena, 2010; Gil *et al.*, 2008; Ngai *et al.*, 2008). Only a very limited range of academic literature addresses evaluation theory (Smith, 2012 p.xi-xii), and, whilst Smith naturally advocated the volume for which he was writing the Foreword, Cousins and Chouinard (2102) also devoted more attention to method than to theory.

2.3.1 – Definitions and Perspectives

Evaluation was defined as *"…refer* [~~s~~ – ing] *to a process that seeks to determine as systematically and objectively as possible the relevance, efficiency and effectiveness of an activity in terms of its objectives, including the analysis of the implementation and administrative management of such activity."* (Papaconstanntinou and Polt, 1997). Their definition was pivotal in the opening section of Potter and Storey's (2008) framework for evaluation prepared for the OECD. Firstly, Potter and Storey (2008, p.16) drew attention to evaluation being a process with a specific purpose, such as policy improvement, which is particularly relevant for this research because it illustrates the interconnectedness of processes in an open system, as well as indicating generative mechanisms driving policy developments. Secondly, Potter and Storey (2008, p.16) highlighted the use of the terms *"…systematic(ally)…"* and *"…objectively…"* indicating that evaluation provides an audit trail that can be assessed for objectivity. Evaluators should not be influenced by entrenched positions or vested interests that might skew outcomes in a particular, preferred, direction when there is little supporting evidence. Better informed evaluators are able

to make decisions concerning future interventions, or changes to existing programmes, interventions, or policies[2].

Evaluation in the context of social policies, programmes and interventions has been defined as *"…the systematic assessment of the operation and/or the outcomes of a programme or policy. … The purpose is the improvement of the programme or policy either by encouraging the elimination of unsuccessful interventions or by giving guidance for how the existing intervention can be modified."* (Weiss, 1998b p.320). Stufflebeam and Coryn (2014, p.3) claimed that evaluation provides '*…non-arbitrary information for decision-making…*' and go on to develop a formal, operational definition:

"…evaluation is the systematic process of delineating, obtaining, reporting, and, applying descriptive and judgemental information about some object's merit, worth, probity, feasibility, safety, significance, and/or equity.".

They drew a distinction between 'merit' – intrinsic excellence irrespective of cost – and 'worth' – quality under consideration of context and cost (p. 8/9).

There is a tendency for evaluation texts to reflect the perspective of the professional evaluator; someone who would be considered external to the focal programme, intervention, or policy. However, social programmes, interventions, and policies can also be evaluated by local practitioners[3] - those engaged in managing and operating the scheme. Hence, there is a tension between whether professional evaluators are being/should be drawn into the work of managers or operators or whether managers

[2] Throughout this thesis the term 'programmes, intervention, or policy' is used to imply that individually, the terms are interchangeable. Exceptions where appoint excludes reference to any one of the three are highlighted independently.

[3] Fitzpatrick *et al.* (2011, ch.11) use the terms 'insiders' and 'externals' but this cause confusion with defining 'stakeholders' since, by implication, they appear to exclude 'externals' – professional evaluators from being considered 'stakeholders' to the focal programme

and operators are being/should be drawn into work best undertaken by professional evaluators (Weiss, 1998a p.31).

Whilst the broad concept of planning and evaluation is often portrayed as a cyclical, iterative process which drives forward activity in a helical structure (Gosling and Edwards, 2003, p.6), this under-emphasises the impact of epicycles of evaluation that occur within the overall framework. Often, evaluation is conceived to be part of a continuous, iterative, planning-evaluation cycle in which future plans are informed by an evaluation of the outcomes of previous plans (Margoluis *et al.*, 2009). Core activities in evaluation concern data collection and analysis, comparisons to target outcomes, making judgements against either emergent or a priori criteria, drawing inference and making decisions (Grice, 2003, p.3).

2.3.2 – Purposes of Evaluation

Informally, humans evaluate to help make judgements about the outcomes and effects of their own behaviour, and that of others with whom they interface. Formal evaluations frequently take place where it is necessary to demonstrate to others that a particular action is being undertaken and/or that specific outcomes are being achieved (Yap and Thong, 1997). Four functions of evaluation: to judge; to describe; to inspire; and to explain are identified by Pawson (2013, p.29) whilst Stufflebeam and Coryn (2014, p.21) cited the four principal purposes as: improvement; accountability; dissemination; and enlightenment.

Pawson and Tilley (1997, p.xii) stated that *"Evaluation purports to offer the universal means with which to measure 'worth' and 'value'.* […] *…* [It] *confers the power to justify decisions."*. However, their view must be contrasted against the perspective which indicates that evaluation provides only false certainty in decision-making because there is no *"…universal standpoint, that secret scientific key to the truth."*

(Pawson and Tilley, 1997 p.x11). Typically, evaluation provides the 'evidence' for evidence-based policy formulation, and is an integral element of classic experimental design (Pawson and Tilley, 1997, p.4-8).

Weiss (1998b, p.x and 1998a, p.27) commented that she came to realise that evaluation serves many purposes, certainly much broader than simply providing information for decision-makers. For example, she refers specifically to *"…evaluation findings have many other important uses. They often have significant impact on agendas, options, and opinions in long-term and indirect ways."* Additionally, Weiss (1998a, p.24-26) recognises the explicitly political aspects of evaluation by highlighting outcomes such as: ideas and generalisations that influence policies; the knowledge that evaluation is being carried out, which can be used either positively - to demonstrate that the need for development is being taken seriously - or negatively – to defer much needed change until the findings and recommendations from an evaluation have been produced; or the injection legitimacy and substance into programme justification. However, simply the fact that evaluation is being considered or conducted can influence both positive and negative perceptions of the intervention being evaluated. One view may be that there are difficulties with the evaluation and therefore, an evaluation is needed to identify and correct weaknesses, but alternatively, another view may be that the intervention must be valuable, a worthwhile effort because it is subjected to evaluation which necessarily involves the expenditure of time and effort. Depending upon the style of evaluation being practiced, other outcomes can include 'team-building' through collaborative effort, shared learning and critical thinking concerning assumptions and actual practice for intervention managers and staff.

The rationale for undertaking evaluation is clearly contextually specific but common purposes include:-

a. Making adjustments during the operation of a programme, intervention or policy;
b. Determining the future of a programme, intervention or policy;
c. Testing a new programme, intervention or policy;
d. Choosing alternatives;
e. Justifying funding, including continuation of funding;
f. Postponing decisions likely to prove unpopular;
g. Subjugating responsibility to others (the evaluators?);
h. 'Window-dressing' decisions already made.

As indicated in the preceding paragraph, simply undertaking an evaluation can confer legitimacy on some programmes (Weiss 1998a, p.25) but, unfortunately, evaluation can also become a 'pawn' in a political game and the actions and behaviour of stakeholders can sabotage outcomes, ensure that the evaluation lacks sincerity, and prevent others taking the evaluation outcomes seriously (Weiss, 1998b p.22-25).

Patton (1994, p.312) focused on developmental evaluations that take place as an initiative is being designed, with the purpose of providing data that justifies the aims and objectives, styles and types of activity, target audiences, processes required and criteria for eventual formative evaluation. He noted that formative evaluation is considered inferior to summative evaluation.

Weiss (1998b, p.31-32) suggested that there are parallels in the dichotomy between formative and summative evaluation, which are terms attributed to developments in educational policy by Michael Scriven in the late 1960's, and the dichotomy between process and output evaluation. Formative evaluation (Scriven, 1991, p.168-169) takes place during implementation with the purpose of providing data concerning immediate improvement, modification, and adjustment. Depending upon the length of time over which the initiative is operating, formative evaluations may develop an

iterative cycle which drives forward continuous improvement. Summative evaluation (Scriven, 1991, p.340) is conducted post-initiative with the purpose of measuring or judging the *"…merit, worth or value…"* of the intervention or elements of the intervention. This is perceived as the classical form of evaluation (see sub-section 2.3.5 – Alternative Approaches to Evaluation) and concentrates upon whether outcomes have achieved the aims and objectives established at inception.

Formative and summative evaluation principally concern intentions – how is the outcome from the evaluation to be used? – whereas process and output evaluation refer to assessing different components and phases within the programme operation. Stufflebeam and Coryn (2014, p.21-23) regarded formative evaluation as being primarily concerned with providing information for process improvement in the development and operational stage of a programme or policy, and often building towards summative evaluation. Summative evaluations are usually retrospective judgements that are conducted post-programme or policy implementation. Neither prescribes a particular approach to evaluation; careful selection is required in accordance with purpose and context.

Russ-Eft and Preskill (2009, p.20-22) noted that conventional evaluation is a form of performance measurement, with evaluators pre-determining the areas or issues for investigation, pre-defining measures of acceptable performance, and then seeking data to confirm or refute performance attainment to the pre-determined acceptable standard[4]. It does not seek explanation for performance attainment; does not seek to enhance understanding of the causes of performance attainment, and does not seek data or information beyond the limits required to assess performance in the pre-

[4] Typically, conventional evaluation focuses more upon effectiveness – have the required outcomes been achieved? – than efficiency – have the desired outcomes been achieved in the most resource-effective manner?

determined areas. Given that the fundamental purpose of investigating the adoption of critical realist perspectives in an approach to evaluation is to explore whether it contributes to broadening and deepening both explanation and understanding of a focal programme, it is not surprising that the critical realist stance explored in this research is positioned (see sub-section 2.3.5 – Alternative Approaches to Evaluation) as a counterpoint to the various conventional approaches to evaluation highlighted because critical realism is an underpinning research philosophy enabling it to be applied to any style of evaluation; it positively embraces methodological pluralism making it particularly suited to mixed method rather than single method approaches; it is equally suitable for both formative and summative evaluation; and recognises and highlights issues such as meaning, perception, and interpretation that a typically overlooked in conventional evaluation. Of course, adopting a critical realist perspective does not guarantee producing any more outcomes than any one of the conventional approaches to evaluation because of the influence of the evaluator on the choice and implementation of style chosen, the interpretation of the data and information generated, and the decision to use outcomes for particular purposes. Undertaking conventional evaluation can contribute towards wider assessment, and is limited more by the decisions made by evaluators than by methodological shortcomings.

2.3.3 – Development of Evaluation

A number of authors have traced and classified the development of evaluation including Pawson and Tilley (1997), Weiss (1998), Fitzpatrick *et al.* (2011) and Stufflebeam and Coryn (2014). In varying amounts of detail they collective identify six phases of development starting with early programme development from about 1800 to about 1940 which became slightly more sophisticated between about 1940 and about 1964. The years between about 1963 and about 1972 are considered to be the foundation of 'Modern Programme Evaluation' with evaluation becoming a

'professional' activity between about 1973 and 1989. The authors then describe 1990's as providing 'current trends and developments', although 'contemporary approaches to evaluation' (see sub-section 2.3.5 – Alternative Approaches to Evaluation) are dated post-2000. This suggests that whilst there appears to be a coherent and collective understanding of the history of evaluation until 21st century, developments in recent years do not appear to have reached a level of maturity or acceptance for a collective stance to emerge sufficiently strongly to be comprehensively documented (see discussion in sub-section 2.3.5 – Alternative Approaches to Evaluation).

Sketching the history of evaluation from 1963 to 1997, Pawson and Tilley (1997) drew parallels with styles of research. Beginning with the classical experimental design based mainly upon positivist views of empiricism and causality, they continued to show that, later, as political dimensions of social policy became more significant, the classical foundation began to give way to a pragmatic perspective. This emphasised plurality in evaluation techniques and, despite reflecting the importance of interpersonal power and politics, remained methodologically rooted in positivism as the means of providing 'acceptable' evaluation outcomes, which are then interpreted as evidence of recommendations for change. Overall, Pawson and Tilley identify four stages in the development of evaluation during this period – experimental, pragmatic, naturalistic and pluralist (1997, p.4).

The experimental perspective was regarded by Pawson and Tilley (1997, p.4-5) as the 'classical' form with a variety of sub-groupings emphasising different aspects of the core approach. These emphasised quantitative measurement and the objective determination of the gap between pre-determined aims and objectives and actual outcomes (Scriven, 2008). Experimental approaches inferred precision, but, whilst providing evidence in the form of objective measurements (Grimshaw *et al.*, 2000),

they still relied upon subjective judgement by evaluators or researchers to determine whether any outcome identified be deemed to be satisfactory.

Experimental forms of evaluation are based upon a successionist or molar theory of causation; causation is not observed but inferred to explain differences between a ‘control’ and a ‘treatment’ group. The treatment group are subject to a form of intervention that is not applied to the control group and the theory infers any observed differences between the two groups must be caused by the ‘only’ influencing factor to change; the intervention. Of course, this assumes that both groups, and any successive testing for results, are examined in precisely the same context and conditions, which was unlikely to occur in social environments beyond any tightly controlled laboratory environment (Pawson and Tilley, 1997 p.6). In 1997 the efficacy of experimental evaluation and associated derivatives remained unproven (p.11) with some successes but inconsistencies across contexts.

The weaknesses of experimental and quasi-experimental approaches to evaluation led to a developing ‘reformist’ agenda in which evaluators turned away from a knowledge-based evaluation to a user-led perspective. Given the inherently politically nature of the environment in which policy decisions are made and supporting evaluation takes place, a form of evaluation that explicitly reflected the needs of policy decision-makers was developed. This approach was labelled ‘pragmatic evaluation’ and was presented as maintaining the status quo (Pawson and Tilley, 1997, p.14/15). Pragmatic approaches were based upon integrating quantitative and qualitative measurement, and data gathering that supplemented objective measures with interpretive statements of meaning. This approach inferred multiple outcomes and multiple interpretations of outcomes and, hence, did not make any claim to precision (Alkin, 1990). Again, it relied upon subjective judgement by evaluators or researchers to determine the final outcome of the evaluation process.

However, evaluation continued to be perceived as primarily concerned with adopting methods that enabled the evaluator to understand a detached reality; scientific realism continued to dominate the post-empiricist era (Bunge, 2006).

A further development took place as evaluators moved away from a focus on assessing the 'outputs' of social programmes and, in recognition of the social dimension of evaluation, began to focus upon the processes used in creating outputs. The hegemony of positivism in evaluation began to slip during the 1970's with the rise of interpretive approaches in qualitative evaluation methodology (Patton, 1980). Additionally, evaluation extended to considering not just the creation of outputs but the implementation of change arising from the programme and/or evaluation. Given the label 'constructivism' by Pawson and Tilley (1997, p.17), it appears that somewhere between page four and page seventeen the name was changed from 'naturalistic' to 'constructivist', but no clear explanation of why or of the significance of this change is given. The perspective draws upon a wide range of stakeholders to the focal programme and was presented in opposition to positivistic perspectives. Constructivist styles of evaluation regarded interpreting meaning as significantly more important than an experimental perspective seeking to establish causal laws (Guba and Lincoln, 1989).

The final development considered by Pawson and Tilley (1997, p.24-28) is labelled 'pluralistic' evaluation and is presented as though melded from the characteristics of experimental, pragmatic, and constructivist (naturalistic?) perspectives. Again, a number of sub-perspectives are identified and whilst Pawson and Tilley praise pluralistic perspectives (p.25), they criticise each alternative for turning away from

objective assessment; *"We find it very difficult to conceive that evaluation, of all things, should not[5] strive for objectivity."*.

Noting the weaknesses of the ontological and epistemological foundation of each type of evaluation, and especially the limitations each imposes for explanation, the development of evaluation approaches grounded in realist principles was advocated (Pawson and Tilley, 1997, p.55-82). They suggested (p.xiii) evaluation should be based on realist methodology; not everyone agrees with this perspective (Fitzpatrick *et al.* 2011, ch.10) although there is wide acceptance of the need to recognise post-empiricist perspectives on explanation (Weiss, 1998b; and Stufflebeam and Coryn, 2014). The critical realist perspective discussed in this research has some similarities with constructivist approaches through the centrality of the exchange of meanings between stakeholders and evaluators, if evaluators, whether professionals or local practitioners are regarded as not being stakeholders to the focal programme but somehow detached, dispassionate, independent observers and analysers (p.23). This is highly unlikely where evaluation is conducted by local practitioners.

2.3.4 - Evaluation and Research

Russ-Eft and Preskill (2009, p.4) indicated that evaluation and research are not synonymous, although there are some similarities, especially in terms of methods used. They go on (p.8) to highlight three significant differences. Firstly, the purposes of engaging in evaluation and undertaking research often differ markedly. Whilst both may seek new information and insights with the aim of learning or developing new knowledge, evaluation tends to be initiated by a particular 'client' seeking specific knowledge or information. Secondly, both serve the needs of different types of audience, responding to different questions using different data. Thirdly, the

[5] Emphasis by underling replaces emphasis by italics in their original document.

mechanisms for effective communication with their audiences differ markedly. The purpose provides the rationale for engaging in the activity, whilst the outcomes provide the justification.

An alternative perspective suggests that evaluation is an output from a research process, and objectives can vary from contributing to answers to specific, pre-determined questions to exploration of emergent issues (Spencer *et al.*, 2003, p.29-30). The majority of evaluation activities are presented as being grounded in positivism, proceeding in a linear fashion, making use of quantifiable data, and with only limited attention to mixed method and/or qualitative, interpretive data (Potter and Storey, 2008). There are obvious parallels with research undertaken within the objectivist/positivist paradigm (Schutt, 2012), and this is especially clear where, in contrast to the research reported here, the intention is to evaluate the worthiness or value of an intervention, rather than, as in this research, seeking to explain how and why observed outcomes have arisen.

For Weiss (1998b, p.15-19) evaluation and research differ primarily in terms of intention, with the former having a utility value in the context of achieving a specific purpose whereas the latter may have wider applicability, including the intention to publish. However, research underpins evaluation by enabling descriptions of programmes and activities to be developed; explaining relationships between variables or influences; and tracing causal sequences (mechanisms) from one variable to another. Hence, those undertaking evaluation activities, whether professional evaluators or local practitioners, should be competent researchers. Pawson (2013, p.62) was critical of the view that the impossibility of achieving closed experimental conditions to enable 'laws' to be determined is recognised by social scientists who acknowledge the limitations to explanation and predictability that this implies for their research. He suggested that the natural scientists research

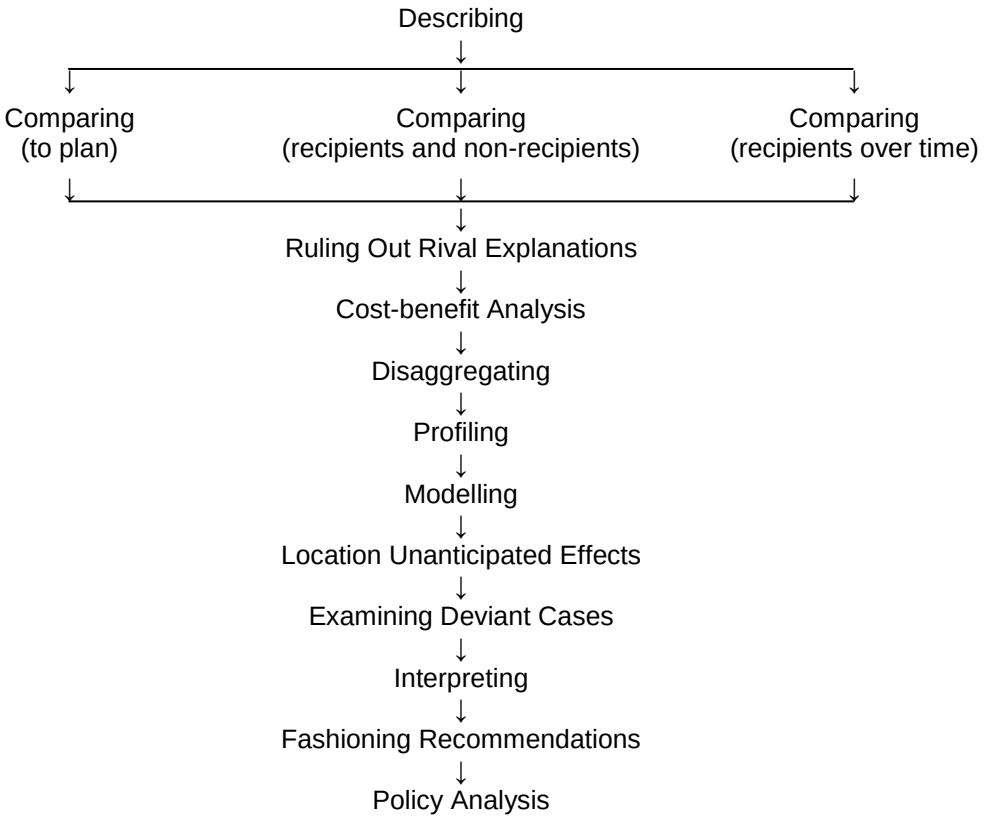
approach of relentlessly pursuing ‘sufficient’ observations to ‘confirm’ a ‘law’ is an appropriate way forward for evaluation research despite never being able to achieve full closure.

According to Pawson and Tilley (1997, p. 12) *“…*[evaluation] *research ought to be constructed so that it is better able to be used in the actual process of policy making.”* Stufflebeam and Coryn (2014, p.45) noted that each variety of evaluation may be based upon separately developed evaluation theory. Further, they commented (p.46) that programme evaluation theory lags behind programme evaluation practice, which is currently dominated by a pragmatic perspective. Nevertheless, further development in evaluation practice is crucially dependent upon the development of sound underpinning theory. Programme evaluation theory is defined as: *“…a coherent set of conceptual, hypothetical, pragmatic, and ethical principles forming a general framework to guide the study and practice of programme evaluation.”* (Stufflebeam and Coryn, 2014 p.50). Programme evaluation practice lacks unified theory with different ontological perspectives underpinning different theories.

Weiss (1998b, p.272-283) described the underlying logic of evaluation drawing principally upon quantitative data as a series of questions that evaluators (should) seek to answer using tools and techniques for analysis which are considered to provide appropriate information for the intended purpose of the evaluation (see Figure 2 – Logic of Analysis in Evaluation: Quantitative Data). Although presented in linear sequential form, this does not prescribe a recommended approach applicable in all instances since the technical feasibility and quality of evaluation is fundamentally dependent upon evaluator judgement in harmony with contextual specificity. Nevertheless, the broad thrust of moving from programme description through comparative analysis, considering alternatives, formulating recommendations and presenting policy analysis is likely to be common.

Weiss (1998, p.283-288) then went on to consider an equivalent analytical evaluation process where the majority of the data available is qualitative (see Figure 3 – Logic of Analysis in Evaluation: Qualitative Data). The broad theme remains substantively identical with the nature of the data, and the intended purpose of the evaluation,

Figure 2 – Logic of Analysis in Evaluation: Quantitative Data



(Weiss 1998b, p.273, figure 12-1)

dictating the selection of more appropriate data analysis and interpretation techniques and approaches. For example, Weiss suggests (p.286) that in qualitative analysis the number of individual cases will be smaller and therefore, this must be reflected in intra-group and inter-group comparisons of variability.

It is not clear why Weiss ends her discussion of qualitative data analysis without considering the 'recommendations' and 'policy analysis' steps that serve to communicate evaluator opinion to stakeholders. This leaves an impression that

Weiss does not believe that forms of evaluation drawing on qualitative data are useful where it is expected that the evaluator will frame recommendations.

Figure 3 – Logic of Analysis in Evaluation: Qualitative Data

(Weiss 1998b, p.285)

Weiss (1998b, p.253-254) recognised the particular strengths of qualitative research methods contrasted with the largely quantitative methods adopted in early, classical approaches to evaluation. The relevant strengths of qualitative research underpinning evaluation include:

a. Increased awareness of the participant perspective and greater responsiveness to their interests;
b. Capacity to address dynamism in both programme and context;
c. Appreciation of time elapse and programme history;
d. Sensitivity to context;
e. No expectation of using pre-prepared data gathering instruments or frameworks for data analysis and interpretation;
f. Receptiveness to unanticipated, unplanned and unexplained events;

g. Flexibility;

h. Importance of egalitarianism.

Of course, the comparative strengths of quantitative and qualitative research underpinning evaluation can be utilised in a mixed-method approach (Weiss, 1998b, p.268). Different methods can be applied when studying different elements and/or different stages within the life of the programme, whilst different methods can provide alternative perspective of the same phenomenon, for example, outcomes. However, greater difficulty may be experienced in interpreting research results and also in validating and verifying findings. The criteria for judging qualitative research may include authenticity, credibility, and illumination whereas quantitative research is likely to be judged in terms of reliability, validity, and replicability. In social environments replicability is unlikely to found because contextual changes are subtle and prevent direct replicability even though equivalence may be present. Unfortunately, Weiss (1998b, p.270) seemed unable to detach from the expectation of 'the truth' as a single objective reality.More contemporary approaches to evaluation have progressed away from a reliance upon largely quantitative approaches towards largely qualitative approaches, and latterly, mixed method perspectives (see sub-section 2.3.5 – Alternative Approaches to Evaluation).

2.3.5 – Alternative Approaches to Evaluation

There are a wide range of alternatives and selecting appropriate approaches to achieve the intended purposes of the evaluation within context is essential to achieving and sustaining technical quality and relevance for stakeholders (Weiss, 1998b p.322). Table 1 – Selected Alternative Approaches to Evaluation is a summary of approaches extracted from the writings of four leading authors, who have traced the development of evaluation (see sub-section 2.3.3) and classified the various perspectives they noted, plus a personal communication from one current

academic working in the field. The taxonomy cannot be considered precise, although robust, because the discourse of evaluation lacks consensus and the vocabulary is applied inconsistently. The table is an interpretation by the researcher of the descriptions used by the named authors.

In compiling Table One – Selected Alternative Approaches to Evaluation the researcher noted very close similarities between the groupings, descriptions and details provided by Stufflebeam and Coryn (2014) and Fitzpatrick *et al.* (2011) whereas only broad categories, rather than specific practical or applied approaches are described by Pawson and Tilley (1997) and Weiss (1998b). Ayers (2015) is strongly influenced by Fitzpatrick *et al.* The researcher selected the descriptions provided by Stufflebeam and Coryn as the major input for the taxonomy, mainly because their text is comprehensive and appears representative; they provide more detail than others concerning the practical application of approaches; and because they provide stronger (more convincing?) justifications for their classifications.

Grouping categories and classifications in the taxonomy is based upon: the purpose or intention indicated for individual approaches; recognisable philosophical or ideological differences; and the methodological preferences indicated when applied in practice. However, the boundaries between approaches and/or categories are not rigid and are not intended to indicate mutual exclusivity – in reality, evaluators are likely to use approaches in combination when undertaking evaluation activity. The term ‘approach’ rather than ‘model’ was preferred by Stufflebeam and Coryn (2014, p.109) when classifying differing evaluation styles because they believed the term is broad enough to capture all the elements of twenty three styles included in their text.

Table 1 – Selected Alternative Approaches to Evaluation

Pawson & Tilley (1997)	Weiss (1998b)	Fitzpatrick *et al.* (2011)	Ayers (2014)	Stufflebeam and Coryn (2014)						
				Category	**Approach**	**Purpose**	**Methods**	**Considerations**	**Strengths**	**Weaknesses**
				Pseudo evaluations	Public Relations Studies	Projecting a convincing, positive public image	Biased samples	Ensuring only positive (or the desired) reporting	No legitimate strengths	Bias; Not representative; Masquerades as legitimate evaluation
		Political Evaluation			Politically Controlled Studies	Technically valid information but selective distribution	Covert investigations; Use of private records	Legality of methods used	Capable of technical accuracy	Distortion by selective release of findings for private purposes
					Pandering Evaluations	Meeting clients exact requirements irrespective of legitimacy	Either directly or after manipulation provide desired outcomes	Popularity of evaluator and method with client	None	Discrediting true/legitimate evaluation
					Evaluation by Pretext	Misleading the evaluator into providing desired outcomes	Apparently legitimate	Machiavellian	Capable of producing accurate information but directed inappropriately	Reflects poorly on evaluator and evaluation practice
	Empowerment Evaluation	Empowerment Evaluation			Empowerment Under the Guise of Evaluation	Providing credible endorsement to group members engaged in own evaluations	Evaluators providing on-the-job training and technical support	Avoiding inappropriate endorsement	None	Implying that false evaluation is acceptable; corruption discrediting the profession
		Consumer-Orientated Evaluation			Customer Feedback Evaluation	Projecting a positive image of focal product or service	Customer survey	Lacks robust empirical foundation	May report genuine opinions	No clear criteria for evaluation; Inconsistencies between raters; no information on respondents; no verification of comprehensiveness

Pawson & Tilley (1997)	Weiss (1998b)	Fitzpatrick *et al.* (2011)	Ayers (2014)	Stufflebeam and Coryn (2014)						
				Category	**Approach**	**Purpose**	**Methods**	**Considerations**	**Strengths**	**Weaknesses**
		Objectives-Orientated Evaluation	Programme-Orientated	Quasi-Evaluation Studies	Objectives-based Studies	Define programme aims and assess achievement	Wide-ranging data gathering and comparative analysis	Tightly focused; measurable aims, objectives and performance criteria	Ease of application	Summative evaluation only; Narrow coverage – captures only pre-determined aims and objectives
		Programme-Orientated Evaluation			The Success Case Method*	Formative evaluation to determine programme successes	Five-step linear process to determine and compare successful and unsuccessful cases	Assumes a normal distribution of samples	Accelerates programme development through early identification of recommendations; positive impact on programme staff morale	Not a comprehensive assessment of merit, value or worth; Mainly short-term focus
	Outcome Evaluation				Outcome Evaluation as Value-added Assessment	Identify aggregated trends in value added over extended time	Hierarchical linear modelling or standardised achievement testing	Requires extensive acceptance to justify expenditure	Effective and efficient standardisation often yielding extensive database	Volatility in identifying and allocating responsibility for change; heavily qualitative; limited scope of variables and output measures
Experimental	Randomised Experiment				Experimental and Quasi-experimental Studies*	Identify causal relationships between specified independent and dependent variables	Randomised control trials	Conditions for RCT to succeed; Consistency throughout trial; Ethical treatment of participants	Outcome focused; unequivocal (in statistical terms only) causal relationships; widely acknowledged credibility	Ethical treatment of control groups
	Cost-Benefit Analysis				Cost Studies	Clear knowledge of resource investment, use, and outcomes	Comparison to the 'do nothing' option of between alternatives	Client expectations; ease of integration with other evaluation activities	Rigorous method; Validated and widely trial	Difficulty in obtaining accurate cost data and analyses

Pawson & Tilley (1997)	Weiss (1998b)	Fitzpatrick *et al.* (2011)	Ayers (2014)	Stufflebeam and Coryn (2014)						
				Category	**Approach**	**Purpose**	**Methods**	**Considerations**	**Strengths**	**Weaknesses**
	Expert Judgement		Connoisseurship & Criticism Orientated		Connoisseurship and Criticism	Describe, critically appraise and illuminate programme characteristics	Critical judgement; Systematic use of evaluators perceptual sensitivities	Expert qualification; likely acceptance of expert opinion	Exploitation of specific expertise	Vulnerability in event of inappropriate expert selection
	Programme Theory-based	Logic Models	Theory-Based		Theory-based Evaluation	Determine strengths and validity of theory underpinning programme	Modelling programme logic	Comprehensiveness in application	Understanding extent of application of programme theory	Lack of theory grounded processes for evaluation in social sciences
	Meta-analysis				Meta-analysis	Collect, summarise, analyse and draw conclusions from multiple cases	Statistical approaches to integrating data; Tests of statistical significance	Bias arising from inclusion of biased original studies; Often only studies showing significant differences are reported anyway; Impact of non-reported studies	Identifying repeated outcomes	Overly strong focus on programme outcomes; Limited by availability of data sources; Not comprehensive in assessment of programme merit, value or worth
Pluralist	Accountability Measures	Decision-Orientated Evaluation		Improvement and Accountability-Orientated Evaluation	Decision- and Accountability-Orientated Studies*	Programme improvement through informed decision-making	Any qualitative or quantitative approach enabling interaction with stakeholders; Similar to participatory approaches	Suitable for both formative and summative purposes; Heavily objective data interpretation	Orientation towards continuous improvement and meeting recipient's needs	Open to interference from stakeholders; Risk of evaluators 'going native' (becoming too closely associated with the programme)
		Consumer-Orientated Evaluation	Consumer-Orientated		Consumer-Orientated Studies*	Assess relative merit, value, and worth of alternatives within and between programmes	Based on objectivist philosophy; uses checklists, needs assessment, goal-free evaluation, and experimental and quasi-experimental designs	Principally summative with a focus on instrumental uses	Independence and objectivity; Comprehensive; High credibility amongst consumer groups	Lack of programme staff engagement; Timing difficult to determine; Difficulty obtaining relevant information

Pawson & Tilley (1997)	Weiss (1998b)	Fitzpatrick *et al.* (2011)	Ayers (2014)	Stufflebeam and Coryn (2014)						
				Category	**Approach**	**Purpose**	**Methods**	**Considerations**	**Strengths**	**Weaknesses**
	Expert Judgement	Expertise-Orientated Evaluation	Expertise-Orientated		Accreditation and Certification	Obtaining approval from an external body	Self-reporting and expert panel judgement	Public interest; Useful in capability development	Information to aid consumer decision-making	Focus on inputs rather than outputs; Open to corruption; Difficult to prevent selective submission
Pluralist	Goal-free	Goal-free Evaluation	Goal-free	Social Agenda and Advocacy Evaluation	Responsive or Stakeholder-centred Evaluation*	Serving needs of wide-ranging stakeholder groups; Building perception and understanding	Informal and interpretive; Emergent continuous communication; Varied, as dictated by need; may use action research	Requires receptive client group	Rejection of objective stance; Use of qualitative methods; Stresses meaningful participation by stakeholders	Time consuming for evaluators; Weak external credibility; Absence of definitive recommendation and conclusions
Naturalistic/ Constructivist					Constructivist Evaluation*	Making sense of emergent constructions amongst stakeholders; Counterpoint to objectivism, realism, and classical experimental design	Based on hermeneutics; Moves from divergent then convergent constructions; Continuous – never completed	Consensus; Acceptance of continuous change and modification	Exemplary disclosure of processes and findings; Acceptance by stakeholders leading change; Draws on experiences of participants	Difficulty and expense of implementation; Requires extended commitment from participants; Uncertainty in participants holding back information; Absence of definitive conclusions
Pluralist	Collaborative or Participative	Political Evaluation			Deliberate Democratic Evaluation	Using democratic participation to provide a defendable assessment	Any form that engages stakeholders in sharing opinions and perspectives	Necessarily requires representative participation groupings	Ensures justice and equity	Difficult to implement; Lack of participation in open form

Pawson & Tilley (1997)	Weiss (1998b)	Fitzpatrick *et al.* (2011)	Ayers (2014)	Stufflebeam and Coryn (2014)						
				Category	**Approach**	**Purpose**	**Methods**	**Considerations**	**Strengths**	**Weaknesses**
	Mixed Method				Transformative Evaluation	Overcoming social oppression; Giving voice and power to marginalised groups	Pluralistic; Mixed-method; Any qualitative or quantitative approach	Participation throughout the process; Cultural awareness of diversity	Social justice and cultural competence	Limited credibility with some stakeholders; Insufficient control by evaluators; Power in hands of (disenfranchised?) stakeholder groups; Doubts over rigour and bias; Determination of evaluation agenda
Pragmatic		Utilisation-focused Evaluation		Eclectic Evaluation	Utilisation-Focused Evaluation*	Providing information needed to fulfil objectives defined by users NOT by evaluators	Situationally responsive: active-reactive-adaptive; Any deemed to add value in context	Participant awareness of evaluation processes; Need for coaching and training by professional evaluators	Universal applicability; Situationally / contextually adaptive; Focus on evaluation impact and acceptance by clients; Emphasis on formative evaluation	Loss of involved users/clients; Open to corruption; Dependent on quality of user group for effectiveness; Heavenly dependent on negotiation skills
Pluralist		Participatory Evaluation			Participatory Evaluation	Programme improvement over summative judgement of merit, value, or worth; Emphasis on process, conceptual, and symbolic use rather than instrumental use	Involving stakeholders, especially intended users, throughout process; Flexibility; Pluralistic	Similar to utilisation approach; Awareness of participants – training/coaching interventions required	User-friendliness; Relevance to stakeholder; Likely buy-in by stakeholders	Relativism over objectivism; limitations on technical quality; Questionable viability; Difficulties in defining and measuring programme impacts; Emphasis on implementation rather than complete evaluation approach

Approaches marked with an asterisk are singled out by Stufflebeam and Coryn as the *"…best approaches for 21st century evaluations…"*

The approaches classified as ‘pseudo evaluations’ are not considered in this research because each perspective is, in some way, flawed in construction, application, or use. Hence, the evaluation outcomes produced cannot be considered legitimate.

Quasi-evaluations are typically output-focused and in this research, the evaluation already undertaken as part of exemplar intervention, described in section 4.0 – APoC Scheme, belongs in this category as an example of the application of an objectives-based study. It can be considered synonymous with conventional evaluation. The objectives-based evaluation undertaken already undertaken may contribute to appropriate meta-evaluations. Theory-based evaluation may be considered as an appropriate classification for two styles of evaluation explored within this research, but may not prove to be a sufficiently close representation to embrace both.

Improvement and accountability orientated evaluation brings together approaches that appear to fulfil the fundamental purpose of enabling evaluation to provide information to assist decision-makers in improving the effectiveness and efficiency of an intervention, programme or policy. The decision and accountability approach is strongly focused on the decisions made during design and implementation that may explain how and why an intervention functions as it does and achieves identifiable outcomes. Its principal disadvantage is a heavy reliance upon objectivity which does not give proper weighting or consideration to stakeholder perspectives on explaining the performance of the intervention.

Social agenda and advocacy evaluations are philosophically much more representative of stakeholder perspectives stressing active participation. These approaches are especially useful where the intention is to use evaluation to give voice to the needs and wishes of underrepresented groups in society. Having a

pluralistic perspective, it is likely that these approaches will make extensive use of multi- or mixed-method stances in data gathering, analysis, and interpretation.

Finally, the eclectic category strongly depends upon developing approaches that receive wide acceptance and cooperation from those participating in and effected by the focal intervention or programme. With a strong user focus there is an emphasis on providing relevant information that enables performance improvement from the perspective of participants rather than management. Disappointingly, the participatory approach is criticised for subjugating objectivism to relativism and the reluctance to recognise the narrowness of objectivism probably reflects the historical progressive development of the approaches summarised in the taxonomy.

Only systematic and rigorous evaluation can provide sufficient validity and reliability to satisfy stakeholder's needs for quality and relevance, according to Stufflebeam and Coryn (2014, p.26). Despite the development and expansion of multidisciplinary approaches to evaluation, post 2005, the crux remains being evidence-based (p.39). Whilst recognising that a wide range of approaches are used in contemporary evaluation, Weiss (1998a, p29-30) states that she regards 'constructionism' and 'post-modernism' as threats to the essential function of evaluation.

Evaluation can be used to provide feedback within a constrained programme environment but often results are accessed by others seeking to learn from the evaluation for other programmes or purposes (Weiss, 1998b p.323). Weiss (1998a, p.28) was particularly critical of evaluation approaches that provide only a retrospective view of programme operations and outcomes, indicating that a more forward-looking, learning perspective offers the opportunity for programmes, policies, and potentially organisations to develop.

Additionally, evaluation is best conducted with a 'think local; act local' attitude since mechanical transfer of one approach from context to context is not possible in social environments (Weiss, 1998a, p.29). Each specific time and place is unique. However, Weiss (1998a, p.29) recognised that the quest for *"…more effective utilisation…"* of evaluation demands that learning from the experiences of others is possible and advocated a form of 'reflective transfer' based on Schön and Rein (1994) concept of '*reflective practice'*. Essentially, this entails seeking out contexts and conditions which are sufficiently similar to enable reflective learning to occur. Despite being an important outcome from evaluation, learning is often not recognised or is undervalued. Indeed, learning in evaluation has arisen more by drawing upon the inheritance from other research fields and the resultant application of new perspectives than from research into evaluation (Weiss, 1998a, p.23).

In this research the primary interest concerns the contrast between approaches which focus upon identifying and measuring outputs and those approaches which, either independently or as an extension of some form of performance measurement, seek to explain and understand how and why a programme or intervention functions as it does to achieve the identified outputs. This does not infer that one intention is superior to another, but is intended to highlight the relationship between performance and explanation, accepting that performance and outputs should not be restricted to objective measurement of visible phenomena. Defining performance measures and the criteria for judging performance brings certain points into sharp focus and can influence the behaviour of those engaged in managing and operating the programme being evaluated (Weiss, 1998a, p.26). Involving stakeholders in the iterative process of planning and implementing evaluation helps balance competing demands and is likely to facilitate acceptance of evaluation outcomes (Weiss, 1998b p.323-324), even if the findings may reflect detrimentally upon some stakeholders.

Classical/conventional approaches to evaluation of public sector supported interventions are often based on performance measures and criteria principally drawn from econometric analysis and focus upon evaluating input additionality – whether the resources provided to the enterprise in the form of subsidy or other support are matched by at least an equal spend from the recipient enterprise on the target activity - and output additionality – the proportion of the outputs produced which would not have been achieved unless public resources were used to support the activity (Georghiou *et al.,* 2004, p.7). A third element of their evaluation arose because a form of outcome arising from the intervention had been recognised, but was largely ignored in classical approaches to evaluation (Georghiou *et al.*, 2004, p.7). This element is known as 'behavioural additionality' and reflects differences in the behaviour of members of the enterprise arising from the intervention.

On the grounds that only anecdotal evidence for behavioural additionality was presented Clarysse *et al.* (2009, p.1518) were critical of Georghiou's work (2004). In contrast, Clarysse *et al.* claimed to have confirmed that behavioural additionality exists (p.1526) and that input and behavioural additionality are closely related (p.1524). Their research demonstrates correlations, but is unable to confirm any causal explanations (p.1524).

Additionality is not necessarily limited to single enterprises (Autio *et al.,* 2008, p.59). They define 'first-order additionality' as firm-level technological learning and innovation outcomes arising directly from firm-specific R&D subsidies and noted that in other literature this may be included as "input additionality". Knowledge spill-overs, technology diffusion, and knowledge exchanges within communities of firms might also give rise to firm-level technological learning and innovation outcomes and where this occurs, this is defined as 'second-order additionality'. First-order additionality is neither a necessary nor a sufficient condition for the realisation of second-order

additionality. For example, sector-specific R &D programs may, because of knowledge spill-overs, give rise to enhanced innovation outcomes even in firms such as sub-contractors that do not directly invest in R&D.

Behavioural additionality receives less attention in the evaluation of the impact of research and development subsidy programmes than either input or output additionality (Afcha-Chávez, 2011, p.95), yet it can result in both positive (learning to become more effective) and negative (taking additional risks) consequences. Section five – Findings and section six - Conclusions indicate that behavioural additionality may have arisen as a result of the intervention that provides the basis for the empirical research undertaken and reported in section four – APoC Scheme and section five - Findings.

Making reference to a comment by Weiss (1990, p.171), which indicated that evaluation was having little impact on decision-making concerning social programmes, Pawson and Tilley (1997, p.2) stated that their primary interest lies in developing evaluation methodology to assist in *"…making sound policy decisions. "* (p.11). In reality, information derived from evaluation is likely to be only one small input in decision-making processes (Weiss, 1998b p.45). Using the terms 'real evaluation', 'realistic evaluation' and 'realist evaluation' almost interchangeably, Pawson and Tilley's (1997, p.215- 219) perspective reflected the view that it is possible to conduct evaluation in such a way that the basis of the evaluation, and the outcomes, are an accurate reflection of true reality. Ontologically, realist evaluation, like conventional evaluation, adopts the perspective that reality exists independent of the actions and perceptions of the observer.

Although lacking clarity of expression Pawson (2013, p.13) suggests that realism can provide a philosophical basis for research supporting evaluation. He comments on

the difficulties of developing practical approaches but usefully summarises a central interest in using evaluation with a realist foundational to explain what aspects of a social programme work for which stakeholders and in what contexts and circumstances.

A realist evaluation agenda should be characterised by a number of distinctive features (Pawson, 2013, p.13-27). Firstly, realist evaluation should have a focus on improving interventions/programmes by highlighting examples of effective and efficient implementation. The examples may range from single to aggregate multiple instances. Secondly, realist evaluation should have twin foci on both processes and outcomes. It may also be useful for there to be a third focus on evaluation methodology, since the effectiveness and efficiency of the evaluation process itself may be an influencing factor. Thirdly, multiple methods should be applied within the overall realist approach. However, the underlying objectivist stance in realism tends to undermine the application of more qualitative approaches to data analysis and interpretation. Fourth, realist evaluation should have an explanatory focus with Pawson summarising the purpose as discovering *"what works for whom, in what circumstances and why?"* (p.15). Fifth, the explanatory focus should be grounded on the sound application of programme theory, which should provide not only the basis for explaining the operations of the programme but also provides a basis for testing the sixth characteristic. Realist evaluation should be based on C-M-O configurations; Context-Mechanism-Output configurations.

C-M-O configurations are propositional statements espousing a theory of how and why an intervention or programme works as it does. It should explain why an outcome arises from the actions of certain mechanisms in a given context or circumstances. The root of explanation is to develop testable context-mechanism-outcome (C-M-O) configurations. Each C-M-O configuration is specific to the

programme being evaluated with each component having meaning only when considered in the light of their function in providing explanation. Pawson (2013, p.27) states that realism draws eclectically upon adjacent, often competing propositions with the researcher needing to develop their own contextually specific definitions of context, mechanism and outcome relevant to the focal programme. The essence of the realist approach to evaluation is the progressive refinement of C-M-O propositions, which includes reflecting multiplicity both of outcomes and explanations.

Mechanisms in C-M-O configurations are regarded as explanatory, not as influencing factors or variables that constitute elements of context (Pawson and Tilley, 1997 p.65). They provide an account of the operation of processes that drive regularities in the behaviour of the subjects exposed to a particular intervention. Mechanisms are regarded as change agents reflecting the choices and capabilities that individuals and groups bring to a particular situation (Pawson, 2013 p.115). Astbury and Leeuw (2010, p.363) summarise contemporary literature and comment that mechanisms link causes and effects indicating that identifying mechanisms is crucial in developing detailed explanations of social phenomena. Their definition (p.368) of a mechanism: *"…underlying entities, processes, or structures which operate in particular contexts to generate outcomes of interest."* indicates that mechanisms are usually hidden; vary with context; and generate outcomes, but should not be confused with programme activity. Mechanisms are a contributory cause of programme activity. Identifying mechanisms is important because there is a clear link to the development of programme theory explaining how and why a programme might function as it does to produce the outcomes it does, but there is very little practical guidance in extant literature on how to identify mechanisms and differentiate them from context. This is a particularly challenging task in establishing C-M-O propositions. Realist evaluation acknowledges stratified reality accepting that mechanisms will exist below the surface, visible domain where statistical correlations and constant conjunctions might

be considered clues in helping to identify mechanisms. Mechanisms are not universal causal laws; instead they are situationally specific providing plausible explanations for visible phenomena. To delve below the visible surface level and separate mechanisms from context requires researcher/evaluator interpretation and judgement – reality is mediated by cognitive processes in any event.

Adopting the metaphor of 'fishing' Astbury and Leeuw (2010, p.374) describe an approach to identifying mechanisms but note that there is no set approach, no administrative exercise, and no boxes to tick. Instead, the researcher/evaluator applies creative interpretation and judgement to social and behavioural theory to create plausible explanations drawn from the proposition that certain mechanisms must exist, have been triggered in a certain way, and must be at work in producing outcomes. The veracity of their plausible explanation, including the mechanisms that are considered likely constituents of the explanation cannot be determined absolutely. Progressive refinement of C-M-O propositions does not confirm true representation of a causal mechanism. It serves only to strengthen belief in the plausibility of the explanation offered, including the postulated mechanism.

However, the realist approach has rather too narrow a focus and tends to seek explanation in the form of single mechanism. A critical realist approach is far superior in appreciating and reflecting the influence of multiple mechanisms on outputs and multiple influences on or intertwines within mechanisms. Realist approaches tend to regard mechanisms as 'black boxes' and it is not possible to open the box and look inside to identify and explain how the mechanism itself is operating. Only critical realism really appreciates and reflects the interconnectedness of influences operating in the complex, dynamic open system that characterises society.

In citing an example of an intervention concerning criminal behaviour, Pawson and Tilley (1997, p.152) point out that the development of the intervention is founded upon prior programmes, previous research and theory, and whilst a derivative of their abstract C-M-O configuration evaluation, even with this foundational knowledge, *"…can never explain its unintended consequences, or indeed all its failures."* They go on to offer the framework based upon realist philosophy advocated in their perspective of realistic evaluation as assisting the accumulation of knowledge for future interventions.

Interestingly, Pawson and Tilley (1997) did not specify into which of their own four categories of evolution they would classify realist evaluation. It is assumed that they would regard the approach as pluralistic, mainly on the grounds of being amenable to the use of multiple methods and the timing of their development because the approach certainly does not favour relativism over objectivism as other example of pluralist approach included in Table 1. Later, Pawson (2013, p.13-15) whilst calling for a realist(ic) approach to be added to the range of approaches considered to be evaluation methods, acknowledged that generic realist research extends beyond evaluation. Realism is an underlying philosophy of research which, in itself, is not an approach to evaluation. In evaluation, realism influences the type of data gathered and the ways in which data is analysed and interpreted. This is true for critical realism too, which shares its roots with aspects of realism (see sub-section 2.4 – Critical Realism). Hence, at least in theory, either realism or critical realism could underpin any of the approaches described in Table 1, proving a suitable research strategy can be developed that yields data and information useful for evaluators and decision-makers.

Earlier approaches to evaluation cannot cope with environmental dynamism, which characterises the social world, and suggests an alternative approach, such as critical

realist metatheory, may be necessary. The contention here is that, given the limitations of realist evaluation, especially its inability to cope with contemporary conditions, taking a step towards adopting the principles of critical realism may offer deeper and broader explanations of the mechanisms driving an intervention or initiative and, hence, may provide a richer explanation of outcomes. It is the gap in the literature between realism and critical realism, translated into the gap between realist evaluation and critical realist evaluation that provides the stimulus for this research.

This gap provokes crucial questions. What is critical about evaluation approaches drawing on critical realist research philosophy and strategy? What and how does a critical realist research add to evaluation, whether undertaken with positivist ontology and objectivist epistemology using quantitative data, or with subjectivist ontology and an interpretivist epistemology using qualitative data?

Despite accepting and adopting core concepts of realism it is argued in this thesis that the realistic evaluation framework provided by Pawson and Tilley is not immune from many criticisms identical to those which stimulated their desire to move beyond experimental, pragmatic and constructionist evaluation. This constitutes part of the justification for suggesting that critical realist metatheory may be an approach that will advance evaluation processes. Later work (Pawson, 2013)[6] has not kept pace with developments in evaluation; for example, there is no reference to the terms 'additionality' or 'behavioural additionality', despite discriminating between the evaluation of mechanisms and the evaluation of outcomes (p.19-28) and including an

[6] Professor Nick Tilley appears to have published primarily in the field of criminology since 2001 and the comment does not appear relevant to his most recent published works.

extended example of realist synthesis in the evaluation of social programmes (p.159-190)[7].

The realist perspective, favoured by Pawson and Tilley's (1997, p.220), like earlier evaluation approaches, still assumed causality based upon a repeatable regularity which moved their approach away from a realist perspective back towards pragmatic evaluation grounded in a successionist view of causation. The fundamental assertion in realist evaluation is still to seek regularities as causes. In later works, Pawson promoted the realist approach (Pawson and Manzano-Santaella, 2012, p.177): as broadly based and welcoming, as a general research strategy, as not inferring a strict procedure, and as being grounded in Popperian (1983/1992) and Campbellian (1969) philosophy. Resolutely maintaining that mechanisms, mediated by context explain outcomes, Pawson and Manzano-Santaella (2012, p.182) stated that *"…mining mechanisms requires qualitative evidence, observing outcomes is quantitative…"* as a justification for the contemporary vogue for multi-method approaches to evaluation.

Pawson (2013) distanced realist evaluation from a critical realist perspective, even though he acknowledged critical realism as one of four approaches to addressing programme complexity (p.47) and confirms that *"Realist evaluation and critical realism are at one assuming that collective constrained choices permeate social life…"* (p.64). He indicated his disregard for critical realism by stating that the perspective uses *"….philosophical smoke and mirrors to bluff its way to an ideological solution."* De Souza (2013, p.142-143) interpreted Pawson as positioning himself as distinct from critical realism in favour of joining a trend toward developing realism as an empirical research strategy. Greenhalgh (2014, p.264), in her

[7] Note that the page references given here reflect the actual printed text. The text itself has an extremely poor index and many entries do not appear on the pages indexed.

commentary on realist synthesis as an approach to reviewing and synthesising evaluations of social programmes, noted that *"…Pawson is always at pains to stress that his version of realism is distinct from critical realism and does not take on board every proposition of critical realism."*. Yet, she indicated that both Pawson's realism and critical realism share common ground in generative causality; the stratified nature of reality, belief in understanding and explanation grounded in foundational mechanisms.

This argument is centred on the fundamental difference between physical and social sciences and the implications for research methodology, including evaluation (Pawson, 2013, p.61). The natural and social worlds are both too complex and dynamic to be understood through systematic, descriptive, factual analysis and hence, both natural scientists and behavioural, social scientists employ theorisation as a form of simplification. He maintains (p.63) that social science should embrace generative causality, since observed patterns in social behaviour replicate those in the natural world that are grounded in regularities. However, Pawson immediately subjugates social science to natural science by suggesting the former should seek to replicate the latter (2013, p.63), but gives neither explanation nor justification for his view.

Pawson (2013, p.64-69) explained his disaffection from critical realism as being centred upon his rejection of ontological depth. Certainly, critical realist evaluation demands transcending surface observable features to find explanation and Pawson's interpretation seems to be overlooking the point that whilst the observer has a real experience, explanation can only be achieved if all strata are in alignment given acceptance of the key concepts of causal power and underlying generative mechanisms.

Indicating his belief that both natural and social systems are founded on enduring underlying mechanisms Pawson (2013, p.69) suggested that, in critical realist metatheory, *a-priori* reasoning is given greater emphasis than empiricism – theory replaces experiment – which appears to contradict his own comments on the value of theory underpinning evaluation. For this reason he stated (2013, p.71) that critical realism is a parody of real science, being no more than another attempt to develop a *"…a totalising explanatory system(s)…"* and is, consequently, a strategy that has no use in social enquiry. However, Pawson's (2013, p.71) comments completely miss the central tenet of methodological pluralism, which is essential in operationalising a critical realist perspective in empirical research, the type of research that often underpins evaluation.

Like any form of evaluation both a realist and a critical realist approach to evaluation are likely to provide the most useful information when selected for their appropriateness to context, philosophical underpinning, methodological strengths, and ability to serve the intentions of the evaluation. Both espouse explanation and understanding, but when positioned vis-à-vis other approaches summarised in Table 1 the relative strengths and weaknesses of the two closely related approaches become clearer. A realist approach would be positioned in close association with theory-based, decision- and accountability-orientated, transformative, and utilisation-focused evaluation. It shares strengths in applicability, acceptance of mixed-method, contextual adaptability, and impact emphasis. However, its major weaknesses concern its lack of understanding meaning in influencing interventions/programmes, its objective ideology, and its lack of attention to stakeholders.

A critical realist approach would be positioned in close association with theory-based, decision- and accountability-orientated, responsive or stakeholder centred, constructivist, deliberate democratic transformative, utilisation-focused, and

participative evaluation. Like realist evaluation it shows strengths in applicability, acceptance of mixed-method, contextual adaptability, and impact emphasis but, additionally it has strengths in the development and application of programme theory, equal emphasis on both formative and summative intentions, openness to both objective and subjective stances, use of qualitative research methods, egalitarianism, recognition of the importance of meaning, and facilitation of meaningful participation. However, its major weaknesses concern difficulties in amalgamation in meta-analysis, difficulties in defining widely-accepted criteria to judge quality, implementation (because of a lack of clear empirical methodology in the light of the centrality of methodological pluralism), and understanding/acceptance by participants.

Given that a fundamental tenet of the evaluation of social programmes is to foster change arising from improved policy and practice, Pawson and Tilley (1997, p.115) commented that the plethora of seemingly unconnected evaluation activities considering apparently similar interventions operating in apparently similar contexts must be brought together through the amalgamation of findings and knowledge. Whilst advocating amalgamation Pawson and Tilley (1997, p.150-152) acknowledged the ontological and epistemological limitations that constrain the development of transferable outcomes in policy and practice. The consequences of these constraints, including the 'open' nature of social environments, inability to control contextual influences, the sentient nature of human kind, continuous dynamism, and the contingent nature of programme operation, inevitably leads to fallibility and transitive rather than intransitive conclusions – *"This is not defeatist talk, it is realist talk. These epistemological limits on what can be known exist for all forms of enquiry. The open system nature of investigation confronts all forms of social research. The perpetual nature of social change is a challenge to all perspectives of evaluation methodology."*

2.4 - Critical Realism

Critical realism is the second pillar supporting this research. Contemporary critical realism shares some characteristics of realism, which has been defined as *"…the doctrine that there are real objects that exist independently of our knowledge of their existence."* (Schwandt, 2007, p.256). Empiricism and positivism are hegemonic within scientific realism (Boal *et al.*, 2003, p.84-98) emphasising sensory data in identifying causal association between variables: *"*[The empirical approach]*…at the level of sense data, generated through observation and experiment."* Lovell (1980, p.19). However, contemporary critical realism recognises the causal role of deep-seated, structural mechanisms: *"…deep ontological furniture of the Universe, rather than at the surface…at which experience is located."* (Lovell, 1980, p.19).

This research draws on scientific realism's belief in a reality independent of the observer (Sayer, 2000, p.2), but yet acknowledges that understanding reality is mediated by cognitive processes occurring within the observer (Delaney, 1999, p.194). Contemporary perspectives on critical realism in social sciences are grounded in Bhaskar's transcendental realism (2008) and critical naturalism (1998a) and emphasise that it acts as a counterpoint to the perceived antagonism between objectivism and subjectivism. Maxwell (2009, p.108-110) argued that critical realism should not be advocated as the 'correct' philosophical stance for qualitative research suggesting that *"The essential characteristic of critical realism is that it combines ontological realism with epistemological constructivism in a productive, if apparently inconsistent 'constellation' of positions."* Both objectivism and subjectivism provide useful clarifications that aid understanding and explanation of social phenomena, but Bhaskar's interpretation (1998a and 2008) of empirical phenomena and complexity in an open, social world is particularly enlightening because it recognises the rarity of closed conditions which underpin traditional science.

The key features of extant literature on critical realism are as follows:

1. there is an emphasis on a clear separation of ontology from epistemology (Day, 2007, p.117-118);
2. it draws heavily upon Bhaskar's concept of ontological depth (Blom and Morén, 2011, p.62-63) in showing that critical realist metatheory differs markedly from conventional objectivist and subjectivist views by unpacking and expanding the conflation of domains and strata that obfuscate causality;
3. there is a distinct separation of visible outcomes, which can be observed as experiences in the empirical domain using appropriate methodologies, and underlying causes rooted in events and mechanisms lying in the actual and real domains, which are not observable and can only be 'known' through inference (Danermark *et al.*, 2002, p.88-96);
4. critical realism expresses an opposition to traditional 'flat' empiricism that fails to transcend the empirical stratum. It *"…repudiates a science that reduces knowledge to knowledge about the directly given or observable."* (Danermark *et al.*, 2002, p.96);
5. as expressed by Bhaskar (1998a, p.36-37), it seeks to transcend the conflation of structure and agency through the Transformational Model of Social Action;
6. critical realism juxtaposes methodological individualism and the obliteration of the individual (Manicas, 2006, p.75-84);
7. it favours the transitive dimension of reality (Sayer, 2000, p.10) and stands against universalistic claims to 'truth', such as the correspondence theory of truth (Sayer, 2000, p.40-42). Understanding phenomena can only ever be partial, albeit it may be refined through time, but can never reach the ultimate of directly explaining reality (Sayer, 2000, p.68-70).
8. its emancipatory credentials are manifested in the drive to explain social phenomenon through understanding social causes grounded in generative mechanisms (Collier, 1998, p.444-452);

9. it emphasises critical reflection through critical reasoning that transcends the norm (Bhaskar, 1998b p.418-428).

The dominant themes of extant literature concern the re-statement and incremental development of core philosophical concepts (Groff, 2004), and discussion of the methodological implications. Examples of research conducted from a critical realist perspective, are much less prevalent (Cruickshank, 2003 and Aastrup and Halldorsson, 2008). It is perceived as an 'under-labourer' providing the philosophical foundation for understanding and explanation (Patomäki, 2010 and Hostettler, 2010). It provides the ontological framework for a specific piece of research, where the philosophical framework is used to justify the methodological approach (Welsh and Dehler, 2007 p.406-407). This perspective presents critical realism as under-labouring for the sciences and normally, each specific publication is grounded in one science but makes passing, comparative references to others (Joseph, 1998 p.74-75). Reed (2009, p.66) summarises the contribution as under-labouring to provide "…*a depth-ontology, an explanatory logic, and a conception of critique…"* He goes on to identify three streams of research: ethnographic, historical and ideological/discourse-based (p.67). The research undertaken for this thesis is most closely aligned to Reed's 'ethnographic' stream, because, although it does not rely upon ethnographic techniques, it aims to develop an in-depth understanding of the micro-political power relationships and processes that form generative mechanisms embedded within institutional frameworks in a specific organisational context.

2.4.1 – Domains and Strata

Bhaskar (2008) contended that realism illuminates both the natural and social world and, in common with positivists, maintained that reality is independent of the observer.

Figure 4 - The Concept of Ontological Depth.

Domain / Stratum or level	Real	Actual	Empirical
Mechanisms	✓		
Events	✓	✓	
Experiences	✓	✓	✓

Reproduced from Groff, 2004, p.17

Unlike positivists however, Bhaskar (2008, p.13) conceived reality as being enacted in three causally related domains or spheres of influence: the empirical, the actual, and the real. These are divisible into three ordered strata or levels: experiences, events, and mechanisms. Each stratum and/or domain is a distinct entity, independent of, but linked to, adjacent strata or domains (Hartwig, 2007, p.400-401). Conventional paradigms, such as positivism, accord with empirical realism and conflate both domains and strata, implying that a single empirical experience gives direct access to outcomes, including those that certainly arise in the real and actual domains, and in the events and mechanisms strata (Sayer, 2000, p.12-13).

Human experience of natural phenomena, located within the empirical domain, (Collier, 1994, p.44) can arise in the course of every-day life or as a result of deliberate experimentation; for example, feeling the wind on your cheek or purposively holding up a wetted finger. The deepest stratum, the real domain, comprises the mechanisms that cause the events and experiences observed; for example, gravity causing the transfer of molecules of gases in the atmosphere from regions of comparatively high atmospheric pressure to regions of comparatively low pressure. In both the natural and the social worlds, it is not possible to directly observe or experience all levels of reality (Collier, 1994, p.42-45); the deeper levels can only be inferred or theorised from observation at the higher levels. For example,

gravity cannot be observed; only the visible effects caused by the influence of gravity on real entities can be experienced.

Mechanisms in the real domain trigger events in the actual domain and give rise to experiences in the empirical domain (Danermark *et al.*, 2002, p.59-66). Outcomes arise from the complex relationship between powers, structures, and tendencies that create generative mechanisms (Fleetwood, 2011, p.83). Human experience is limited to sensory perception of outcomes located in the empirical domain; the actual and real domains are not directly detectable or observable.

Understanding events and mechanisms located in the real and actual domains can be gained only through inference from outcomes observed or detected in the empirical / experiences domain / stratum (Lewis, 2000, p.249). Hence, research, such as that reported in this thesis, with the aim of understanding these hidden domain and strata must begin with observations before moving from empirical/experience to actual/events and actual/experiences, and subsequently on to real/mechanisms, real/events, and real/experiences.

Critical realism distinguishes clearly between the objects/entities of the real world and theories and knowledge of those entities and reality (Frauley and Pearce, 2007, ch.1). Objects form the intransitive dimension of knowledge whilst theories form the transitive dimension (Sayer, 2000, p.10) and, whilst the transitive dimension is dynamic and uncertain, the intransitive may not change at all (Danermark *et al*., 2002, p.22-24). Knowledge of reality is permanently fallible because of dynamism and uncertainty in the transitive dimension (Collier, 1994, p.50-51). For example, has evolving knowledge and theories (transitive domain) of cosmology changed the constituent elements of the universe and the way in which it operates (both intransitive domain)?

2.4.2 Generative Mechanisms

Elster (1989, p.3-10) showed that outcomes arise from the actions of mechanisms. Typically, in social sciences, the terms ‘mechanism’ and ‘generative mechanism’ are used as if synonymous. Unfortunately, even though there are actually clear distinctions, ambiguity and inconsistency in extant social science literature remain, with differing perspectives on the relationship between mechanisms, generative mechanisms, causality, and explanation presenting different implications for this research.

Mahoney (2003) reviewed the major explicit definitions of mechanisms and concluded that there are four principal categories of mechanism found in social science. These are:

a) causes of outcomes;

b) intervening processes;

c) causal propositions not yet fully or properly defined; and

d) an unobserved entity that generates an outcome (p.3).

Norkus (2005) highlighted the confusion that surrounds the concept of mechanisms in social sciences ranging from regarding mechanisms as synonymous with causal law through to mechanisms arising from narrative analysis. Reiss (2007) opposed the ‘new mechanist perspective’ (NMP) which is said to regard the sole purpose of social science as providing theoretical explanation linked inextricably to causal mechanisms (p.164). He mentions several perspectives that discuss mechanisms and points out that whilst each is subtly different they share common features, including a belief that theoretical explanation is paramount. Hedström and Ylikoski (2010) drew attention to the diversity of sciences in which the concept of mechanisms has been applied and indicated that this hampers the possibility of developing definitions that will adequately reflect the differing characteristics of the

contexts in which mechanism-based analysis has been attempted. They also emphasise ambiguity in the use of the term ‘mechanism’ with authors sometimes referring to causal process whilst others refer to components in the process. The two views are not mutually exclusive, however, and both elements are required for detailed explanation of an observed phenomenon.

It is not axiomatic that once triggered a mechanism will give rise to an observable outcome since the appropriate combination of pre-requisite conditions must be present for an observable event to arise (Blom and Morén, 2011, p.63). The operation of a mechanism is contingent upon context and, hence, what is successful in some situations and for some actor/subjects is not necessarily successful for other actors, or the same actors in other contexts or even in the same context on every occasion. Activation of a trigger leads to the operation of a mechanism, but in an open system, constituent elements of any one given mechanism may also be constituent elements of other mechanisms (Elster, 1999, p.1). Mechanisms, once triggered, may collide and counteract one another, or might combine to create different consequences, or the essential pre-requisite conditions for operation might not be sustained (Elster, 1999, p.9). Crucially, a mechanism can only be known to exist, to be triggered, and to operate if and when it gives rise to an outcome that reaches the empirical domain and is observed by a sentient being capable of interpreting the observation (Blom and Morén, 2011, p.63).

Critical realists differentiate between a ‘mechanism’, which describes the way in which the causal powers of an object are exercised and a ‘generative mechanism’, which describes the way in which causal powers are exercised that lead to an event that is detectable by a human observer (Blundel, 2007, p.51). The observable event must occur within the experiences stratum and empirical domain, otherwise it may not be detected by a sentient being, but the trigger event giving rise to the operation

of the mechanism can be located in any domain and/or stratum (Groff, 2004, p.16-20). Mayntz (2004, p.244) adopted the term 'generative mechanism' to link the concept of mechanism to explanation and states that the structure of a mechanism must remain constant or the sequence of activities contained within the mechanism will describe a separate mechanism.

During his summary of five notions of mechanisms found in social science research Gross (2009) neatly summarises the dominant perspective found in critical realism by drawing upon the work of Collier (1994). The core of critical realism lies in mechanisms linking the three domains of empirical, actual, and real events and progressing from an open toward a closed perspective (Gross, 2009, p.361). Experience of the operation of mechanisms is always within an open systems context and it is not possible, except perhaps in very confined, absolutely closed experimental contexts, to isolate a single mechanism to investigate the triggering activity, particulars, powers, and actions that give rise to the effect observed (ibid). Hence, observation of mechanisms in action in the social world provides insight into the combined effect of multiple mechanisms. The combined effects include triggering other mechanisms, magnifying the effect of mechanisms, and cancelling out or ameliorating the effects of other mechanisms. This all occurs within a context where the actors, who are themselves powerful particulars within the operation of mechanisms, exhibit an intrinsic capacity to transform social relationships, act with free will, and are influenced by their own internal psychological mechanisms affecting their perceptions of intentions and actions exhibited by themselves and other actors in the scenario (Gross, 2009, p.368-369).

This thesis draws upon Gross's concept of social mechanisms in seeking explanations of the outcomes observed and interpreted, arising from the impact of an

innovation support mechanism in the form of a grant (Section 4.0 – APoC Scheme and Section 5.0 - Findings).

2.4.3 – Causality and Explanation

Causality and explanation are fundamental issues in the research underpinning this thesis. The relationship between trigger events, generative mechanisms or mechanisms, and observable outcomes is indicative of the perspective on causality found in critical realism. Causality for critical realists differs markedly from the view put forward by positivists and the view found in simple realism.

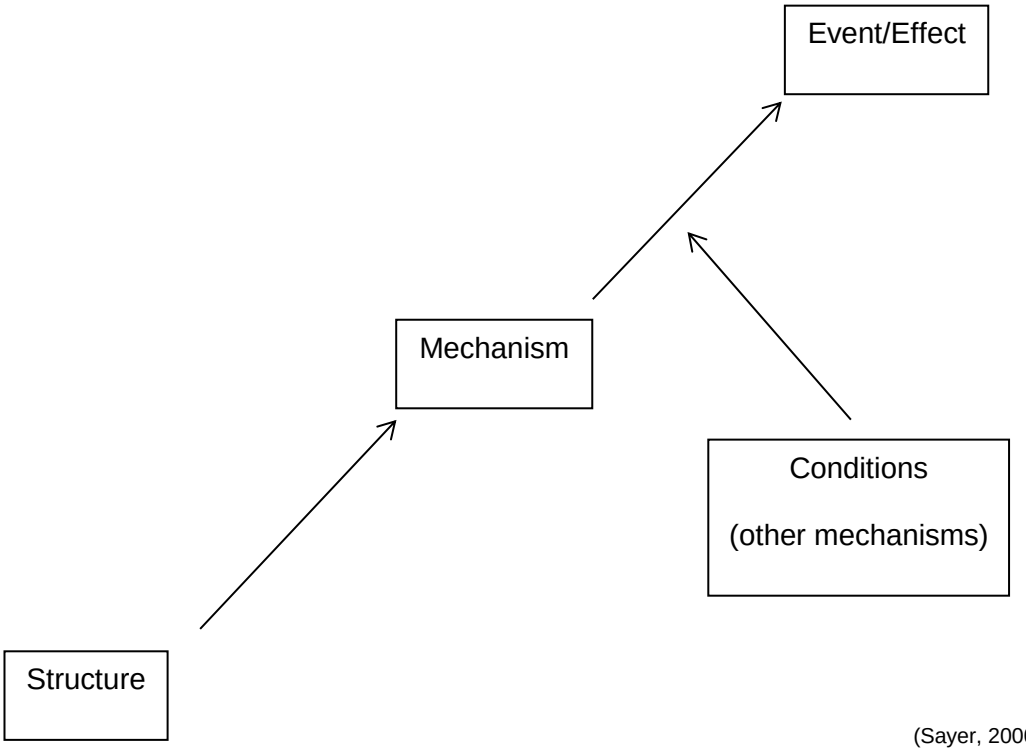
In natural sciences the term 'mechanism' is often linked to explanations of causal relationships (Woodward, 2002, p.S366). For positivists, causal relationships are conceived as *"…universal regularities…"* (Danermark *et al.*, 2002, p.53) between empirically observed stimuli and outcome. Typically, in conventional evaluation causality is perceived as simple, and linear, grounded in the assumption of invariant relationships between causes and effects, even where observation of outcomes arising lags behind the occurrence of the assumed cause. Attempting generalisations in social sciences is always inadequate because local circumstances are always specific to particular context and are never replicated across broad circumstances (Erickson, 2012, p.687). Hence, causal mechanisms may be identified and explain a particular setting, but in another context may manifest in an entirely different way: *"…causal outcomes follow from mechanisms acting in contexts..."* (Pawson and Tilley, 1997, p.58).

The critical realist view of causality rejects determinism, regularity, consistency, and inevitability (Sayer, 2000, p.93-97). Triggering interrelationships, through which new independent properties and powers emerge, occurs only on a case-by-case basis; there are no universal regularities, constant conjunctions or consistencies (Groff,

2004, p.16-20). Causes are not related to the number of times an association is observed (Sayer, 2000, p.14). Definite outcomes may arise but remain outside the scope of human knowledge and experience (Elder-Vass, 2007b, p.472-475). Causal mechanisms explain the relationship between a cause and effect, rather than describing an association between two events that simply happen to occur together (Elster, 1989, p.5). Critical realist evaluation recognises this and seeks to explain each outcome as an individual phenomenon.

Figure 5 – A Critical Realist Perspective on Causality - illustrates a typical representation of causality as portrayed in critical realism (Sayer, 2000, p.15). 'Cause' is the trigger that influences intrinsic powers within an object, or subject, to induce transformation through the action of a mechanism. However, the cause-effect association is influenced by contingent circumstances which may or may not be observable and observed, and which explain variation in the effect observed. When objects within a single stratum, or crossing the boundaries between strata, interact they may combine and, through a process known as 'emergence' (Elder-Vass, 2005, p.316-320), give rise to a new object or phenomenon. The new object or phenomenon is differentiated qualitatively from any of the initial, independent objects and possesses new properties that arise from, but cannot be reduced to, the properties of their originators (Bhaskar, 2008, p.113; Danermark *et al.*, 2002, p.59-66; Sayer, 2000, p.12-13). Bhaskar, in particular, (2008, p.113) denotes a hierarchical dimension to emergence, suggesting that emergent properties are necessarily at a higher level than the properties of the constituent elements. For example, in natural science, substances comprise a specific combination of chemical elements (water as a combination of hydrogen and oxygen) where water has different properties, arguably more useful and more expansive than either hydrogen or oxygen as single elements.

Figure 5 - A Critical Realist Perspective of Causality



(Sayer, 2000, p.15)

Critical realism reflects an open social world, comprising events and conditions, experiences and perceptions, structures, powers, mechanisms and tendencies which reflect the understanding that the outcome of the activation of a mechanism is not guaranteed because of interrelationships with other mechanisms (Pratten, 2007, p.194). Bhaskar points out (2008, p.141) that constancy of association is possible only in the 'closed' conditions necessary to sustain regularity and determinism which underpin Humean causal law. The social world is an open system populated by sentient entities acting with free will and hence, even in situations where the same cause appears to be operating, the same effect/outcome is not guaranteed for a number of reasons. Hence, notions of causality are uncertain and *"…causal laws must be analysed as the tendencies of things, which may be possessed unexercised and exercised unrealised, just as they may, of course, be realised unperceived*." (Bhaskar, 1998a, p.9-10).

A general definition of explanation, provided by Lipton (2009, p.619) links causality and explanation – *"…a causal model of explanation maintains that to explain some phenomenon is to give some information about its causes."*. From a critical realist perspective Pratten (2007, p.193) stated that explanation is *"The process of making some initial phenomenon intelligible."* and noted that there are many varieties of explanation. For Bunge (2004, p.208) explanation lies in converting 'black box' phenomenological theories into 'translucent-box' theories with their superior qualities of elucidation. Lipton (2009, p.621-622) comments however, that not all explanations are causal explanations.

Often, in explaining phenomena it is necessary to consider contrasting alternative plausible explanations and ask why was this cause the explanation rather than the alternatives? Causal mechanisms must explain why something happened in the way that it did, accepting that it may have been possible for it to happen in an alternative way (Elster, 1989, p.6). Dray (1957) illustrated the distinction between 'how-possibly' and 'how-actually' explanations. The latter concentrate upon explaining actual events whereas the former explain how outcomes considered impossible might have arisen. Reiner (1993) commented that Dray's perspective pivots on whether an explanation establishes a necessary condition for the observed outcome to arise or a necessary element of a sufficient condition.

Mayntz (2004) focused exclusively on social macro-phenomena and commented that the principal advocates of mechanism-based approaches to explanation regard the concept as overcoming the deficiencies of statistical analyses. Both statistical correlation and 'covering-law' models of explanation lack understanding of relationships and do not adequately reflect the reality of human behaviour. Human behaviour is characterised by uncertainty, which contrasts markedly with the

regularities underpinning the application of causal explanation found in natural sciences and which is assumed, by positivists, to be replicated in social phenomena. Pratten (2007, p.193-194) highlighted the ontological foundation for causal explanations derived from critical realism. In particular, he noted that there is a clear dichotomy between applied and theoretical explanations and emphasised the distinction between statistical probability, giving rise to 'inductive probabilistic' explanation, and universal law as the basis of 'deductive nomological' explanation. Critical realism emphasises mechanism-based explanations and refutes statistical explanation as being merely descriptions of quantitative association – correlation not causality grounded in knowing and understanding mechanisms (Sayer, 2000, p.21). In open systems, explanation is derived from contextually specific triggers activating mechanisms in a generative model of causation. Explanation must, therefore, acknowledge the stratification of reality (depth ontology) and emergent powers arising from relationships that facilitate or constrain the impact of causation (Sayer, 2000, p.27).

Lipton (2009, p.623) warns of two specific problems in linking causality and explanation; ascertaining the direction of causality and confusing contextual conditions with explanations. Causes explain effects but effects do not explain causes (Lipton, 2009, p.626). Contextual conditions may impact upon a phenomenon, whereas explanations are specific to the change taking place that is being explained. A further difficulty can arise when causality appears self-evidencing, which can create circularity.

2.4.4 – Causal Power

The research reported here takes a lead from the work of critical realists such as Harré and Madden (1975), who advocate a generative theory of causality, tempered with a cautionary note that causal explanations have only a minor role in

understanding social phenomena. For Harré and Madden (1975, p.7) causal power is an aspect of the inherent characteristics or nature of an object; a powerful particular, which cannot be separated from the object. Power is a potential which exists whether activated or latent. It may be constant or variable, depending upon whether the nature of the object changes. Cause results from the nature of the powerful particular and the conditions which trigger power to be exercised (Harré and Madden, 1975, p.10-12). The effect is conditioned by the nature and characteristics of the object being influenced, and the existence of constraining conditions. Harré's research is located in methodological dualism, mechanical versus non-mechanical explanation, highlighted in his demands that critical realists address the issue of how and why 'cause' can reside in, and operate from, something such as social norms that do not possess the characteristics of a powerful particular (Harré, 2000).

In realism, causal power is a property of objects, people, and social phenomena, and each entity may be imbued with multiple powers, none of which are necessarily unique or entity specific (Sayer, 2000, p.85-86). Both natural and social objects possess structure and the characteristics of structure define the 'causal power' of the object – the *"potentials, capacities, or abilities to act in certain ways and/or to facilitate various activities and developments."* (Lawson, 1997, p.21). In critical realism the term 'structure' refers to *"…the way an object is constituted.*" (Blundel, 2007, p.51).

Causal powers can endure or be transitory[8] and exist irrespective of whether or not they are exercised, but when triggered they constitute the generative mechanisms which give rise to effects or events, which may not be observed (Danermark *et al*., 2002, p.55). However, given the role of generative mechanisms as facilitators of

[8] Harré and Secord (1972, p.275-281) indicate that human power to use language is enduring whereas attitudes are transitory.

outcomes, mechanisms do not operate in isolation but in a general milieu that constitutes society. An essential element of social reality is the co-determinative effects of generative mechanisms which can enhance, obscure, counteract, or destroy observable outcomes in the actual and/or empirical domain. For example, a business incubator possesses particular structures and powers which are triggered purposively to stimulate generative mechanisms supporting enterprise creation. However, the combination and complexity of relationships between the powers and structures, and other external and internal mechanisms also triggered, means that outcomes in line with intentions or objectives are not guaranteed – two apparently very similar nascent entrepreneurs may begin to implement very similar business ideas in the same incubator, but within a short period each will have developed and be implementing different strategies for growth.

Pratten (2009, p.190-191) considers that Harré's work has been highly significant in enabling critical realists to develop a concept of causality that stands as an alternative to the Humean perspective (Hume (1777/1975). However, critical realists have, according to Pratten (2009, p.210), yet to respond satisfactorily to Harré's central point concerning the locus of causal power and the nature of powerful particulars - how and why 'cause' can reside in, and operate from, something such as social norms that do not possess the characteristics of a powerful particular (Harré, 2000) - even though Lewis (2000, p.258) stresses material rather than efficient causality, and Groff (2004, p.109) and Kurki (2008) advocate explanation incorporating both formal and final causality.

2.4.5 – Structure and Agency

The social world is shaped through the interaction between two separate, but intimately related phenomena, structure, and agency (Giddens, 1984). Social settings necessarily involve people who exercise human agency. Archer (2003, p.2)

states that in realist social theory, structure and agency are ontologically distinct; different strata in a segmented reality, possessing separate powers and properties. Structure is a property of social systems: *"Structures can be identified as sets or matrices of rule-resource properties"* (Giddens, 1979, p.63-64). It comprises internally related objects, which may also be elements of other structures, or the collective of internally interrelated objects and may be perceived as an element of a larger structure. For example, in the contextual setting for this research, a support institution, such as a business innovation centre, comprises internally interrelated objects (schemes and processes), but is itself a constituent part of a regional business support network, which is itself a component in a national economic development framework.

Agency is constituted from the human property of being sentient, such that a person engages in intentional action based upon the belief that in order to achieve a desired outcome certain behaviour must occur (Barker, 2003, p.233-237). Motivated by the desire to achieve the intended outcome the agent engages in specific behaviour perceived to be required. Written as a logical proposition (Callinicos, 1989, p.36):
Person One desires outcome Z;
And believes that action Y will achieve outcome Z;
Therefore, Person One engages in Y.
Lawson (1998, p.162) pointed out that sometimes it is not possible to explain outcomes as anything other than human beings exercising choice. This results in variation from person to person and, hence, even partial regularities may not be detected.

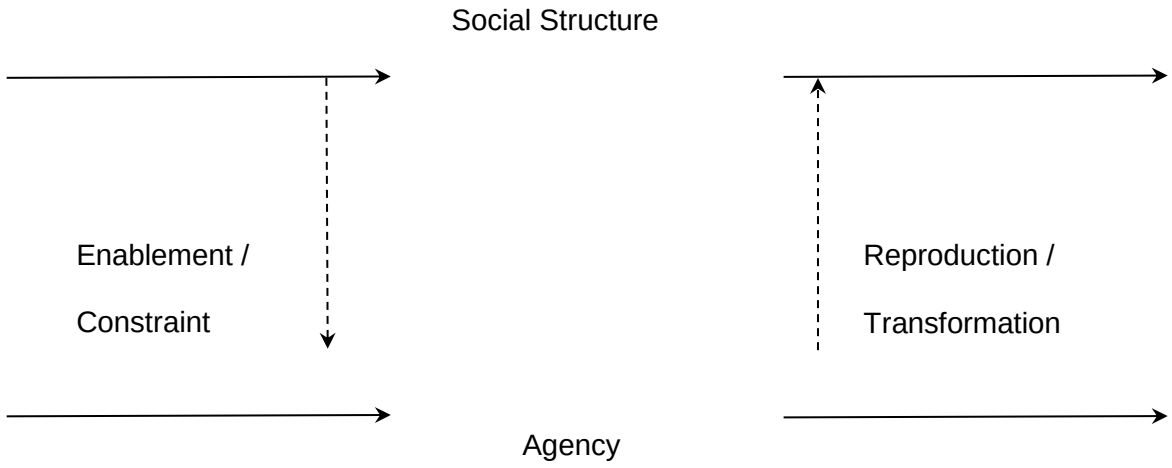
There are several different interpretations and explanations of the relationship between social structure and agency. In classical sociology, structure was regarded as the major influence on society and, from a functionalist perspective (Durkheim,

1895), influence flows from structure to emancipate or constrain the actions/behaviour of individuals. Structures are ascribed real existence, possessing emergent properties that mirror any other material object and hence, become the 'object' for sociological study. Alternatively, the 'agency' perspective reverses the flow of influence and begins with the intentions of individuals. The behaviour of individuals in pursuit of their intentions creates or modifies social structure, but social structure still influences an agent's thought, intention or behaviour – *"…a sociological understanding of agency…does not confuse it with individualism, subjectivity, randomness, absolute freedom, or action in general, but recognises it as embracing social choices that occur within structurally defined limits among structurally provided alternatives."* (Hays, 1994, p.65). A third paradigm, put forward by sociologists such as Bourdieu (1977) represents an intermediate position seeking to understand the point of balance between the two directions of influence. For Bourdieu (1979) cognitive processes necessarily operating within an individual and giving rise to their ideas, point of view, attitudes and so on, are nonetheless, influenced by cultural forces inherent within their society. Structure influences agents but agents have the property of being able to modify or change structure. This avoids both upward and downward conflation (Archer, 1995).

Giddens (1984) views structure as both the instrument for, and the outcome of, social action. However, for critical realists this presents difficulties because, conceptually, structure and agency cannot be separated, cannot be emergent, and therefore, cannot be considered to possess powers or mechanisms. For Layder (1994, p.141) structure and agency exist symbiotically in social practices, whilst for Giddens (1984, p.326) analysis of one component requires that the characteristics of the other component is ignored. Archer (1995) refers to this as a 'central conflation'.

Bhaskar (1993, p.155) was critical of the conflation of structure and agency, and noted that whilst structure and agency are analytically separate, they exist in a time-dependent sequence such that structure necessarily exists prior to social action. Social action then has a transformational action on pre-existent structure producing a modified form. This is the basis for Bhaskar's Transformational Model of Social Action, (figure 6) and plays a significant role in the research reported in this thesis. Social structure is a facilitating prerequisite for human action/behaviour but is also a constraining influence. Agency (human action/behaviour) either reproduces or transforms (changes) the pre-existent structure to create emergence from mutual influence between the strata.

Figure 6 - Transformational Model of Social Activity



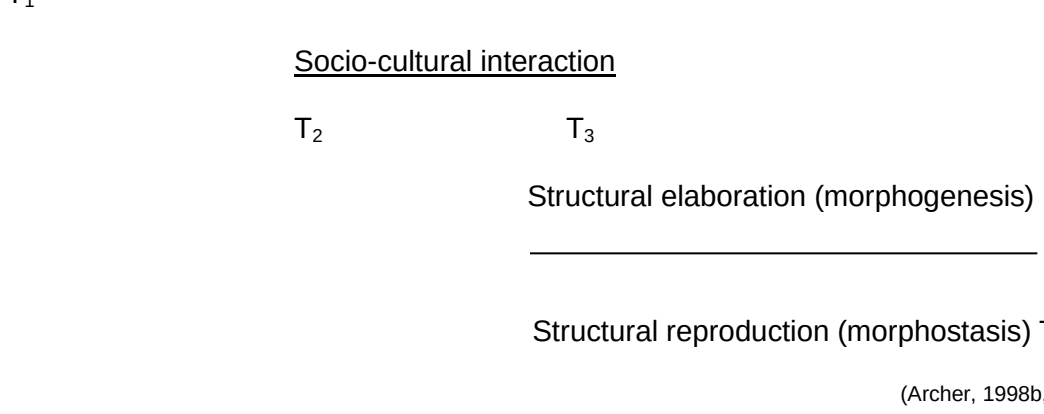
(Bhaskar, 1993, p.155)

The morphogenetic approach complements Bhaskar's Transformational Model of Social Action, although developed independently by Archer (1979). Indeed, Archer is highly complimentary of Bhaskar's model describing it as *"…the generous under-labouring of a philosopher who has actually dug beyond disciplinary bounds…"* whilst at the same time commenting that her morphogenetic approach is *"…produced*

by a working sociologist, recognising the obligation to go deeper into precision tooling to supply a social theory which is pre-eminently usable." (Archer, 1998b, p.379).

Morphogenetics shows that there is no predetermined or enforced form to society. The concept is crucially dependent upon analytical dualism, which requires that structure and agency are analytically separate, but interrelate to one another over time. This introduces time as a further influence in emergence, since structure necessarily precedes transforming action whilst modification (structural elaboration), if it occurs, necessarily follows action (Archer, 1995, p.157).

Figure 7 - The Basic Morphogenetic/Static Cycle



(Archer, 1998b, p.375)

The basic morphogenetic/static cycle (Figure 7) shows that at any given point, T_1, certain structural conditions pertain. Time passes as agency occurs, T_2 to T_3, and equally, time passes as transformation takes place T_4. Hence, moving forward from T_1 to T_4 means that prerequisite structure influencing agency, between T_1 and T_2, may be transformed (changed) and, at T_4, is no longer identical to structure at T_1. Interaction between structure and agency occurs over time between T_2 and T_3, which may result in either no change (structural reproduction - morphostasis) or modification (structural elaboration – morphogenesis) at T_4. The modified structure

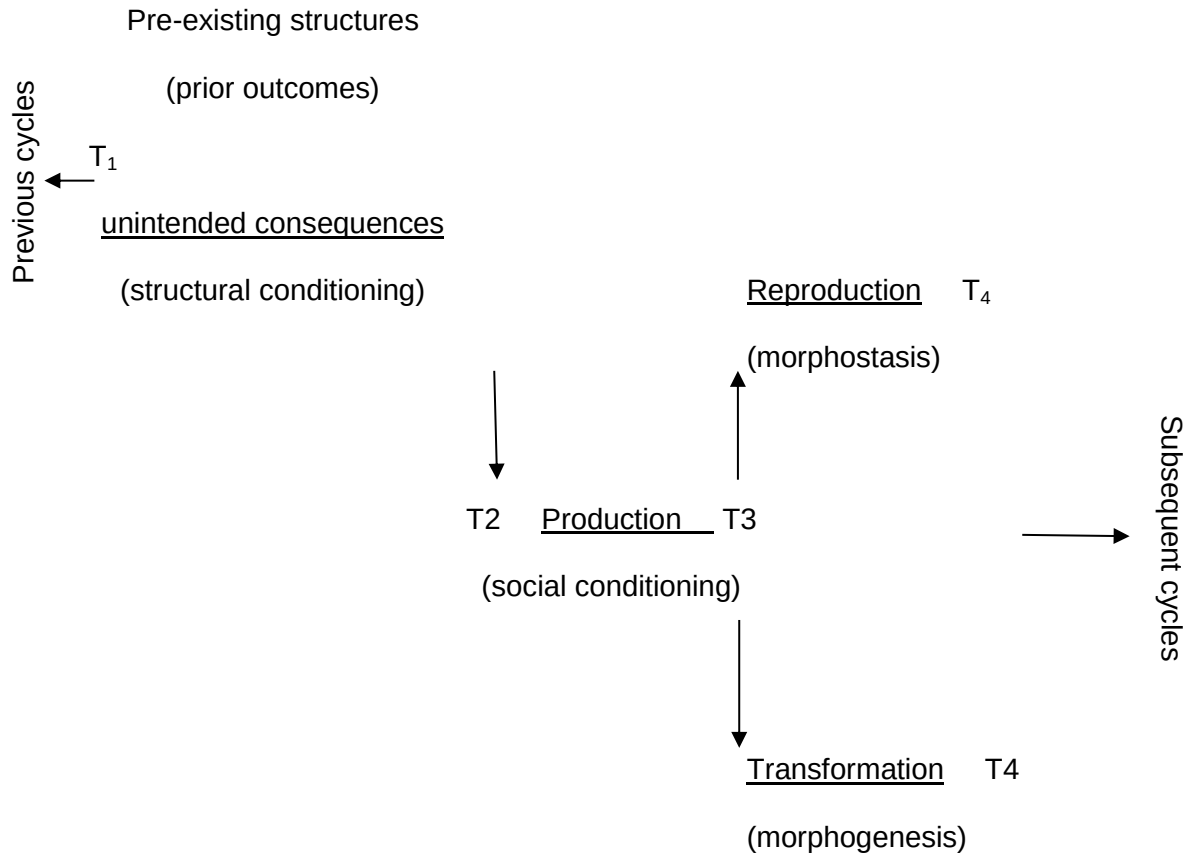
may have the effect of changing the extent to which structure either facilitates or constrains the agent's intended action, which may, in turn, lead to a change in intentions and/or change in the perceived actions required to achieve intention. Engaging in modified agency at T_4 begins another cycle and may also lead to structural elaboration, such that at T_{4+x} structure is not the same as at T_4, which may or may not have been the same structure as at T_1. The modification cycle of changing structure leading to changing agency action drives forward in a helical spiral of mutual influence and transformation/change, which offers a partial explanation for why the social world does not remain constant, but there is never a period when the social world is not structured.

Superimposing the Transformational Model of Social Activity upon the Morphogenetic Cycle (Figure 8) illustrates the close similarity between Archer's stratified perspective on social reality and Bhaskar's stratified ontology that underpins critical realism (Bhaskar, 2008, p.56-62). Archer's perspective (1998a, p.81) presents an alternative to positivism and shows why social theory rejects empiricism, the back-bone of positivism. The three principal reasons (Archer, 1998a p.69) are as follows. Firstly, all knowledge is socially determined; there is no impersonal, non-aligned position of judgement or interpretation. Secondly, society necessarily operates as an open system that prevents the occurrence of closed experimental conditions necessary for prediction. Thirdly, explanation and prediction under empiricism relies upon constant conjunctions between observable objects that excludes any understanding of the mechanisms giving rise to conjunctions. In social reality 'agents' and 'social structures' occupy different strata and operate on different time scales, which is the basis of Archer's concept of 'analytical dualism' (Archer, 1995, ch.3-6), showing how structure and agency relate to one another in a helical spiral driving forward social change. *"Just as for society as a whole, none of these strata provide any unique or*

dominant determination, but each presents a range of courses according to which actors can direct their activities." (Whittington 1989, p.88).

Transcendental realism provides a progressive explanatory methodology of social theory based upon Archer's morphogenesis (Archer, 1995), which is a further element in the justification for advocating critical realist metatheory as a possible approach to driving forward evaluation. At any given point emergent properties arise from past actions and exert a causal influence on interaction. Agents inherit a

Figure 8 - Superimposing the Transformational Model of Social Activity and the Morphogenetic/static Cycle



(Archer, 1998b, p.376)

position within the social structure that conditions their perceptions, values, and beliefs of the situation. However, their freedom to act is also either constrained or facilitated by the current structure. Hence, social interaction is conditioned by structure but cannot be determined by structure because contemporary agents possess their own emergent properties (Archer, 1998a, p.83). A consequence of differing social groups pursuing different actions is the modification, or elaboration, of social structure and, in turn, modified structural conditions influence the actions of future agents. Action conditioned by structure leads to modification of structure which conditions future action and, hence, the interrelationship between structure and agency drives forward social reality. Archer points out (1998a, p.84) that this process of modification is not constrained by time or level and occurs at macro, meso, and micro levels in both the short and long term.

2.5 – Critical Realism and Research

Natural sciences are portrayed as inherently stable and cumulative, despite revealing irregular inconsistencies leading to intermittent epistemological disagreements (Dreyfus, 1986, p.4). In contrast, 'human' (social) sciences are portrayed as characterised by "*…essential instability…*" (Foucault, 2001, p.384). Research designs reflect these general perceptions and are normally selected as the best available, contextually specific route to achieving the desired outcomes.

For the research underpinning this thesis, Hedström and Ylikoski's (2010) criticism of Elster's (1999) definition of mechanism, on the grounds that mechanisms do not need and, indeed, are not routinely *"…frequently occurring…easily recognisable causal patterns…"* (p.1), is significant. A mechanism-based view of social phenomena juxtaposes the traditional empiricist view of generalisations deduced from abstract theoretical principles. Instead, scientific knowledge develops incrementally, adding to current understandings of plausible causal mechanisms.

They went on to call for progression from debates concerning definitions of mechanisms to exemplars of good research practice.

Opp (2005) considered whether explanation by mechanism is the only acceptable form of explanation in social sciences. He argues that explanation by mechanism does not necessarily differ from either causal models or Hempel-Oppenheim logic. The crux of the issue is that explanation by mechanism must be subject to similar, equally rigorous, empirical control as any other form of explanation (p.177). For Reiss (2007, p.166-167) the concept of segmented and stratified reality, with causal mechanisms residing in lower strata, is the only satisfactory form of explanation for social occurrences at higher levels. Reiss's argument was that whilst contributing primarily to explanation, segmented and stratified reality did not contribute significantly to the pursuit of other social science aims such as description, prediction, and control.

Blom and Morén (2011) indicated how Bhaskar's depth ontology means that the only route to understanding generative mechanisms is based up analytical methods. The plausible existence of a mechanism linking two variables may support causal inference, but the absence of a mechanism does not guarantee that any observed correlation may be spurious. Rather, the difficulty lies in identifying plausible mechanisms and discriminating between the mechanisms that may be best explanations, which is dependent upon rigorous methodological approaches. Blundel (2007, p.52) reinforced the point: *"…*[The] *social world consists of real objects that exist independently of our knowledge and concepts, and whose structures, mechanisms, and powers are often far from transparent."*. Schwandt (2007, p.98) emphasised critical realism underscores the importance of context dependence that determines that evidence can only be evaluated in relation to what is being claimed. This perspective resonated with Cartwright (2007a, p.2) who emphasises the concept

of causal pluralism, which Maxwell (2009, p.113) extended into *"..evidential pluralism…"* or the recognition that multiple causes require multiple sources and forms of evidence to justify the contention being put forward.

Kuorikoski (2009) identified two research strategies that each adopts a different concept of mechanism and consequently, gives rise to different definitions of mechanism. Firstly, research based upon the decomposition of observed relationships and the localisation of components within those relationships assumes mechanisms to describe causal relationships which can then be analysed. This is most suited when the aim of the research is to discover and understand more about the components themselves and is labelled a componential causal system perspective. Secondly, research based upon abstraction and the development of models assumes mechanisms to be an abstract form of interaction. This is most suited when the aim of the research is to move from understanding the properties of the components to understanding the properties of the whole, and is labelled an abstract form of interaction perspective. However, the two different perspectives are not mutually exclusive and the relational nature of components within mechanisms may well dictate that an abstract form may be embedded within an analysis undertaken with a component-based causal system overview, and vice versa.

Separating ontology and epistemology, and privileging ontology is fundamental to conducting research with a critical realist perspective, and is the principal characteristic that differentiates it from more conventional positivistic or phenomenological paradigms (Day, 2007, p.117-118). Critical realist approaches tend to address explicitly ontological and epistemological issues which, at best, remain implicit in management research (Miller and Tsang, 2011, p.146).

Critical realism is often regarded as focusing upon its criticisms of traditional experimental science at the expense of developing research methodologies

applicable in practice (Danermark *et al.*, 2002, p.106). Yet, it is characterised by adopting research paradigms that have the ultimate objective of both analysing and facilitating social action that induces change. Use of the term 'critical' in the context of social science research is taken (Cannella and Lincoln, 2009, p.54-56) to mean research that it explores the power that subjects exert, and especially power asymmetries that lead to oppression and subjugation. For example, the discourse of evaluation of research is dominated by the hegemony of positivism that privileges terms such as 'evidence-based', 'replicability', 'validity' and 'generalisability' that subjugate subjectivist, interpretive and qualitative approaches (Morrell, 2008).

Cannella and Lincoln (2009) illustrate the practical potential of critical realist metatheory by outlining research themes that may be addressed:-

a. it challenges dominant themes;
b. it addresses taken-for-granted assumptions, or norms;
c. it exposes underlying structures of power and domination including the hidden structures of power and disempowerment of others;
d. it explores the role of discourse in social life;
e. it reflects the interrelationships between socioeconomics, gender and race;
f. it may touch on colonialism, neo-colonialism, and post-colonialism.

The research underpinning this thesis has the potential to contribute to several themes that would illustrate what is critical in critical realist evaluation (Table 2). In accepting methodological pluralism (Danermark *et al.*, 2002, p.150-154) critical realism proceeds by abduction and/or retroduction, eschewing deductive and inductive reasoning and verification/falsification principles. Abduction is a form of '...*ampliative inference...*' (Psillos, 2007, p.257) and can mean a formal process of logic to develop a plausible, but not logically necessarily, conclusion, and/or a creative and imaginative way of recontextualising phenomena (Danermark *et al.*,

Table 2 – Critical Research Themes in Evaluation Adopting Critical Realist Metatheory

	Depth Ontology	**Generative Mechanisms**	**Abduction**	**Retroduction**	**Explanation/ Prediction**
Hegemonic Themes		Critique of dominant power relationships.			Deterministic causality. Evaluation intrinsic to explanation.
Taken-for-Granted Assumptions	Rejection of conventional ontological assumptions.		Subversion of taken for granted assumptions that endure.	Recognition of importance of values in explanation.	Reformulation of models of understanding and explanation. Critique of models and conceptual tools perceived as most suitable.
Power	Power of emergence.	Challenge to determinism. Structural and strategic forms of power and impact upon generative mechanisms	Challenge to ontological conflation.	Counterfactual rather than associative reasoning.	Explanation must focus upon underlying power relationships.
Domination	Challenge to structures of domination. Relationships within domination structures.	Power of elites.			Weakness of command and control of structural/agency variables.
Discourse			Role of abduction in explanation.	Role of retroduction in explanation.	
Social Characteristics		Critique necessarily assumes existence of a better way of life.	Case by case triggering of causal power.	Challenge to domination structures to shift power.	Challenge to underlying power mechanisms that sustain inequalities.
Colonisation	Challenge to positivism and empiricism in scientific realism.				Challenge to subjectivism in theoretical realism.

2002, p.88-96). It embraces the meaning, interpretation, motives, and intentions of subjects that influence their decisions, behaviours, and actions. Blaike (2010, p.89) uses the term an 'insider' view to remind the researcher not to impose their 'outsider' view of the context of their subjects. Retroduction is also a form of inference that, by utilising counterfactual thinking, enables the researcher to move from observations made in the empirical domain and experience stratum to the prerequisite conditions necessary for the structures and mechanisms in the actual and real domain to create the observed/experienced outcomes (Danermark *et al.*, 2002, p.96-98). However, there is a clear hierarchy in social science practice that favours drawing causal inference from experimental and statistical methodologies, assumed to be free from cognitive and motivational biases (Tetlock and Belbin, 1996, p.32-38). Nevertheless, abduction and retroduction, including their reliance upon counterfactual argumentation are not 'second class' methodologies, providing the researcher adopts appropriate standards of evidence obtained, analysed and applied in a disciplined manner.

Reiner (1993) noted that retroduction aims to provide 'how-possibly' explanations by establishing plausible, possible causes that may account for an observed phenomenon. It does not necessarily address actual causes. However, 'how-possible' explanations may be regarded as precursors to 'how-actually' explanations. Reed (2009, p.59) demonstrated that critical realists employ retroduction to highlight generative mechanisms operating in open environments. Doing so explicitly rejects any form of reductionist explanation, determinism, and logical symmetry between causality and explanation that are fundamental in scientific and theoretical realism. Explanation of causal/generative mechanisms must flow from abduction and retroduction of meanings, observations, and understandings of the subjects/actors in a specific context. Machamer *et al.*, (2000, p.2-3) commented that the usefulness of mechanisms in explanation lies not wholly in the accuracy of definition or description

but in the extent to which the postulated mechanisms facilitate elucidation of the observed phenomenon.

Downward and Mearman (2007, p.87-95) clearly demonstrate the contribution made by retroduction and abduction when using pluralistic (mixed) methods in Economics research. Meyer and Lunnay (2013) highlight that both abduction and retroduction provide broader and deeper analyses of data in theory-driven research than deductive analysis alone is capable of providing: *"The use of abductive and retroductive inference is beneficial for the interpretation of qualitative data, providing a more nuanced analysis than solely deductive inference permits."* (p.14). All three forms of analysis rely heavily upon researchers entering an iterative cycle of comparison between theory and data. In deduction, data that is not in accordance with an initial theoretical framework is rejected, however, in both abduction and retroduction it is precisely this rejected data that forms the basis for progressive, further analysis and theory development. Abduction and retroduction are not presented as replacements for deduction, and there is no suggestion that deduction has no place in research. Rather, analysts must recognise the power, capability, and limitations of each method and use the approaches selectively and probably in combination in mixed method methodologies.

2.6 - Synthesis

The themes emerging from the literature review are positioned at the intersection of prevailing debates within extant literature. Firstly, innovation is perceived as a driver of economic development, growth, and prosperity with the potential to benefit both enterprises that engage in innovative activity and the communities served. Government policy designed to encourage innovation focuses upon supporting enterprises working, either directly or indirectly, towards commercialising applications of innovative new products, services, or processes. Supporting innovative

enterprises is an example where an intervention with a specific intention of facilitating certain behaviour may lead to specific, desired outcomes. The benefits of innovative activity are experienced in financial terms by enterprises and communities, whilst enterprises also benefit from behavioural change and learning.

Secondly, the discussion of evaluation stands at the intersection of the debate concerning the rational, objective, linear sequential model and realist approaches. The latter also links with perspectives on generative mechanisms and on the empirical difficulties of separating the purposes of measurement from the tools and techniques adopted. Conventional evaluation measures outcomes achieved and subjective opinion determines whether the outcomes are acceptable. Whilst initially conventional evaluation tended to use only quantitative data, focusing upon performance management, qualitative data is sometimes used to extend the range of outcomes being assessed. Both conventional and realist evaluation are restricted in terms of their ability to provide comprehensive identification of outcomes arising from interventions, and in their ability to offer explanations.

Thirdly, critical realism is regarded as an alternative perspective mediating the tension between positivism and relativism in social sciences. The discussion of causality addresses the debate between conventional perspectives and perspectives grounded in theories of generative mechanisms and causal powers/capabilities. In following the generative mechanisms stance, the discussion is extended into the application of abduction and retroduction as a means of developing and assessing plausible explanations. Critical realists agree that reductionist ontologies, such as objectivism and subjectivism grounded in the Humean tradition (Hume, 1777/1975), do not contribute to the quest to establish more powerful explanations of causality.

Fourthly, explaining outcomes, irrespective of whether or not they are desired, requires a perspective which recognises ontological depth, the generative mechanism view of causality, and the application of abduction and retroduction to theorise and assess plausible explanations. Abduction and retroduction, as forms of ampliative inference, are perceived as appropriate methods to develop hypothesised causal explanations grounded in unobservable generative mechanisms.

Overall, the research underpinning this thesis is located in the strand of extant literature that demonstrates that the crux of identifying probable causal relationships lies not in the mere conjunction of events, irrespective of the frequency or regularity of apparent co-occurrence, but in the theorisation of plausible causal associations and subsequent comparison between differing theories and abstractions that rely upon the co-determinative effects of generative mechanisms. Conventional perspectives, such as objectivism and subjectivism, grounded in the Humean tradition on causality (Hume, 1777/1975), juxtapose critical realist metatheory, which, founded on causal powers, structures, and tendencies manifested in generative mechanisms as a basis of explanation, lies at the heart of the research.

3.0 - Methodology

From inception this research has been strongly influenced by extant literature. The adoption of literature review techniques (sub-section 2.1 Literature Review Methodology) advocated by Thorpe *et al.*, (2005) and Tranfield *et al.,* (2003) substantially enhanced understanding, and summarised relevant extant knowledge and contemporary approaches to useful research methods. Consequently, extant literature provided the foundation for the decisions made by the researcher in developing the methodological approach adopted. The researcher has also been active in researching, publishing, and supporting small firms engaged in innovation for over twenty-five years; this enabled direct experience to influence the selection of appropriate methodology and interpretation of data.

This section has two aims. Firstly, to explain and justify the decisions made by the researcher in the context of the research aims, the philosophical stance, and the nature of social science. Secondly, to describe, explain and justify the empirical approach, including data gathering, analysis, and interpretation. Further details of APoC are given in Section 4.0 - APOC Scheme, but individual points relevant to methodology will be amplified and explained as required in this section.

3.1 - Influence of the Sciences

"The most productive contribution to social practice that social science can make … is the examination of social structures, their powers and liabilities, mechanisms and tendencies, so that people, groups and organisations may consider them in their interaction and so – if they wish – strive to change or eliminate existing social structures and to establish new ones." (Danermark *et al.*, 2002, p.182).

This research pivots on discussion of three critical issues in the philosophy of science. Firstly, the relationship between natural and social sciences, in particular,

whether there is direct correspondence between approaches in the methodology of researching natural sciences and social sciences. *"The natural world is natural because it does not require action on behalf of human beings for its existence. The social world is social because, by contrast, it does require action on behalf of human beings for its existence."* (Ackroyd and Fleetwood, 2010, p.10). Johnson and Duberley (2000, p.34) drew on Liang (1967, p.53) to compare natural and social science in the context of research in management. While there are similarities between the types and styles of research projects and research questions undertaken, material differences demand distinctive ontologies, epistemologies, and methodologies. This includes necessarily employing differing tools, techniques and procedures in data collection, analysis, evaluation, and interpretation (Blundel, 2007, p.50). In this research, the researcher is strongly influenced by Danermark *et al.,* (2002, p.150-151) who adopt a critical stance in advocating an eclectic selection of both natural and social science methodologies, recognising their relative strengths and weaknesses and underlying assumptions.

Secondly, the characteristics of generative mechanisms, especially their scope, power, and influence in bridging both 'macro' and 'micro' dimensions in social science (sub-section 2.4.2). The researcher was strongly influenced by Hedström and Ylikoski (2010, p.62-63) in seeking explanation of observed phenomena through the concept of mechanisms.

Thirdly, the apparent contradiction between realism and social constructionism, in particular whether it is possible for both to co-exist and provide coherent explanations of observed outcomes. Gergen (2001, p.8) stated that *"…- realism and constructionism are everywhere in conflict."*. Elder-Vass stated that *"…social scientists should be both realists and social constructionists."* (2012, p.3), arguing that realism and social constructionism are not mutually exclusive and antagonistic.

The researcher was influenced most strongly by Elder-Vass in rejecting naïve realism and radial constructionism in favour of accepting that moderate social constructionism has a role to play in interpreting and understanding reality.

3.2 - Research Philosophy

The researcher holds the view that research should not be led by methodology; rather methodology flows consequentially from the influences of philosophical position, the nature of phenomena under investigation, and the aims of the research. "*The way we think the world is (ontology) influences: what we think can be known about it (epistemology); how we think it can be investigated (methodology and research techniques) …"* (Fleetwood, 2005, p.197).

The philosophy underpinning this research is founded in critical realism. It is based on acceptance of the view that 'science', when defined as the search for permanent, universal, causal laws, cannot remain valid in social contexts and must be replaced with the view that science concerns the identification and explanation of causal mechanisms that operate as tendencies (Lopez, 2003, p.77). Naturalism asserts the primacy of natural science methodology and stresses that there should be no specific differences between researching the natural and social domain (Sayer, 2000, p.6). Methodological dualism (also known as anti-naturalism) affirms that the fundamental differences between the two domains demands radically different approaches (Benton, 1998, p.298). Outhwaite (1998, p.22) confirmed that the social world remains an element of the material world but *"…is intrinsically different from the* [rest of the] *material world…"*. Harré (1998, p.48-49) differentiated between *"…knowledge by acquaintance…"*; knowledge gained through direct experience and *"…knowledge by description…"*; knowledge gained by reflective analysis and synthesis. The former provides procedural knowledge through lived experience; the latter a statement of accepted rules and customary behaviours. For Bhaskar (2008, p.26) the

development of a philosophical ontology is the foundation for answering the question *"…what must be the case for science to be possible…?"*.

3.2 1 - Ontology

Critical realist ontology has three core components. Firstly, it posits that both social and natural reality comprise intransitive entities existing independently from human knowledge (Sayer, 2000, p.10-11). However, relying upon sense data to gain knowledge of reality is fundamentally flawed because not all entities are necessarily detectable by human senses. Critical realism does not recognise the correspondence theory of truth (Bhaskar, 1998c p.651) and does not accept the proposition that it is possible to adopt a neutral observing stance and communicate using theory-neutral language (Johnson and Duberley, 2000, p.154). All understanding of reality is founded in theory-laden interpretation. Consequently, although reality exists irrespective of whether or not it is visible to, and identified by, sentient beings, human knowledge of reality is transitive, being conceptually mediated and depending upon human agency (Fleetwood, 2004, p.30).

The second core component states that reality comprises stratified multiple domains corresponding to depth realist ontology (Blaikie, 2007, p.16). This contrasts with positivism, which regards reality as 'flat' and operates as though all strata are conflated into a single stratum (Sayer, 2000, p.12). Bhaskar (1998a) took the view that social reality comprises relationships between structures existing in the deeper actual and/or real domain. Harré (2002) regarded social reality as socially constructed by participant social actors. Neither perspective is necessarily mutually exclusive.

Thirdly, explanation of observed phenomena is necessarily based upon transfactual causal mechanisms (López, 2003, p.76). Mechanisms permeate domains and strata

and interrelate, but are not directly visible. Explanation is, therefore, not limited, as assumed by empiricism, to merely observable causes (Danermark *et al.*, 2002, p.108). It includes plausible, but unobservable, causal mechanisms which, if real, would account for the phenomenon observed (Johnson and Duberley, 2000, p.155).

3.2.2 - Epistemology

Irrespective of the methodological approach adopted, it is crucial to distinguish between ontology and epistemology (Day, 2007, p.117-118), and to acknowledge epistemological relativism (Sayer, 2000, p.47). The epistemic fallacy arises when statements about reality are confused with statements about knowledge that conflate ontology and epistemology (Bhaskar, 2008a, p.16). Epistemological relativism acknowledges that all knowledge must be interpreted relative to historical and cultural contexts (Al-Amoudi and Willmott, 2011, p.30). Fallibilism is accepted (Downward *et al.* 2002, p.490-491), however, it remains necessary to understand the criteria adopted when choosing between plausible explanations, in addition to recognising the reflexive role of the researcher in data interpretation.

Different theoretical and methodological perspectives are required to differentiate between transitive and intransitive objects (Benton, 1998, p.299-301). In this research investigation of intransitive objects is informed by Bhaskar's (2008a, p.186-187) emphasis upon realism, while investigation of transitive objects is informed by Harré's (2002, p.113-114) interest in social constructionism. The overall epistemological stance is neo-realist, which chimes with the depth realist ontology identified earlier (Blaikie, 2007, p.22). It extends beyond empiricism by regarding explanation as embracing depth realist ontology to seek explanatory mechanisms responsible for observed phenomena. In rejecting the ontological, epistemological, and methodological stance of naturalism, critical realists regard the interpretation of

meaning as beginning the journey towards deeper causal explanation (Blundel, 2007, p.53-54).

3.3 - Research Design

The first of the direct influences on the design of this research were the research questions, aims, and objectives concerning comparative analysis; compared to conventional forms of evaluation, does an approach drawing upon critical realist metatheory yield superior outcomes? No prescribed form of outcomes was considered, other than to identify and seek explanation for outcomes. It was not intended that research outcomes would be generalizable beyond context. Instead, the outcomes were expected to accord with the stated intention; to contribute to both providing plausible explanation of causal relationships perceived within APoC and to contribute to the exploration of critical realism as an aid to evaluation.

Critical realism plays a dual role in this research. As indicated above, critical realism is the central subject of the research, especially its capacity and potential to support evaluation. Critical realism is (see sub-section 2.4 – Critical Realism) a research philosophy and is not, in itself, an approach to evaluation activity. Evaluation activity (see sub-section 2.3 – Evaluation) is underpinned by research, which generates data and information used in conducting evaluation. Hence, there is a close relationship between the research philosophy and methodologies that underpin the provision of data and information for an evaluation and the intentions and purposes (aims and objectives) of the evaluation. The brief descriptors often used to label different styles of evaluation (see sub-section 2.3.5 – Alternative Approaches to Evaluation) whilst acting as a broad indicator of the probable underpinning research philosophy and methodology typically providing data and information when the style is used in practical evaluation, do not indicate that other research philosophies and methodologies cannot provide useful data and information. For example, utilisation-

focused evaluation readily draws upon mixed-method research embodying both objectivist and subjectivist philosophies to provide differing perspectives on the programme and outputs being evaluated. As the subject of this research critical realism is explored as a potential research philosophy that may be suitable to underpin many styles of evaluation – the critical issue is really how the evaluators choose to interpret the data being provided; whether they choose to maintain a critical realist philosophical stance into data interpretation.

Furthermore, in order to undertake a comparative analysis of the style of evaluation actually used in the pre-existing conventional, objectives-based evaluation, already undertaken by Scheme management (see section 4 – APoC Scheme) and any enhanced outcomes that can be generated by undertaking evaluation underpinned by critical realist research philosophy, a major component of the empirical research undertaken by the researcher is to select and apply an empirical methodology based upon critical realist principles. Critical realism in this research, therefore, acts as the research philosophy underpinning empirical activity to provide data and information enabling the pre-existing essentially objectivist evaluation to be extended. The outcomes are reported in section 5 – Findings whilst section 6 – Conclusions provides a more reflective and learning-focused interpretation of the comparison between the two approaches together with comments on the potential for extending critical realist perspectives to other forms of evaluation.

The second direct influence builds from critical realism: *"…this dynamic interplay between 'structure' and 'agency'…lies at the very intellectual core of critical realism's explanatory quest."* (Reed, 2009, p.74). There is no obvious, unequivocal design or methodology to apply because the critical realist perspective embraces

methodological pluralism[9] (Danermark *et al.*, 2002, p.150-154). It is a counterpoint to objectivism and subjectivism, but draws eclectically upon both, and other, conventions. Consequently, aspects of the design resembled positivism, using conventional survey techniques to gather both quantitative and qualitative data, but also resembled phenomenology, interpreting social reality as comprising collective meanings, perceptions and understanding. Social reality does not, and cannot, exist independently of human cognition (Searle, 1995, p.2). Critical realist perspectives diverge from conventional approaches primarily in data interpretation: *"Critical realism is only partly naturalist for although social science can use the methods as natural science regarding causal explanation, it must diverge from them in using 'verstehen' or interpretive meaning. While natural scientists necessarily have to enter the hermeneutic circle of their scientific community, social scientists also have to enter that of those whom they study."* (Sayer, 2000, p.17).

The third direct influence was recognition that observed social phenomena are the detectable manifestations of generative mechanisms present in the real or actual domain, giving rise to events in the empirical domain: *"Things have properties; these properties instantiate (transfactually acting) powers; and these powers, when exercised and actualised, are the causes of events and processes."* (Fleetwood, 2009, p.365). Since depth realism recognises that generative mechanisms are not necessarily wholly observable, the research design comprises a combination of abduction (Blaikie, 2007, p.88-104) and retroduction (Blaikie, 2007, p.82-88). It juxtaposes plausible generative mechanisms and identified structures which, when modelled, explain observed demi-regularities, with social constructions evident in the accounts, behaviour, language and meanings of participants. This provides a basis

[9] This does not imply that critical realist advocate an *'anything goes'* stance (Feyerabend, 2010 p.14-19) as the only approach that does not inhibit progress. Rather, critical realists accept that all approaches hold the potential to contribute to research when applied in appropriate contexts.

for the development of theory to deepen understanding and explain issues arising in the context being researched.

The fourth influence was the relationship between intensive and extensive research designs (Sayer, 2000, p.21). Both were perceived as relevant, each playing a different role in illuminating generative mechanisms. Each empirical process or technique was intended to achieve specific purposes and care was taken to ensure each element was used within the parameters for which it had been developed. Hence, the techniques adopted are applied within the limits of accepted principles, taking full account of limitations or weaknesses.

The fifth influence concerned the impact of time on the Scheme and the participants in the research. As described in sub-sections 5.2.1 – Context and Concepts, the Scheme was affected by a change in operating context with consequent impacts on participants. The empirical research commenced shortly after these changes took affect meaning that all participants were able to reflect retrospectively on their involvement. Temporality was perceived in traditional linear form as an inevitable progression forward. Causality was conceived as linking with temporality also in linear form; causes proceeding effects and hence, it was assumed that a participant's engagement with APoC always preceded any outcome arising from that outcome. Additionally, as noted below and in sub-section 3.4 – Empirical Activity, interventions always take place within existing context, which is dynamic and consequently, the relationship between context and intervention varies over time. Context necessarily precedes action (see also sub-section 2.4.5 – Structure and Agency and Figure 7 – The Basic Morphogenetic/Static Cycle) but action may also affect context and over time, actors cognitive and perceptual processes media context. Although perceived in a very simple, traditional linear form, time influenced the choice of the particular design adopted in this research because it was essential to ensure that the

methodological approach would capture and reflect the dynamic interrelationships between context, actions, perceptions and causality.

In practice, the design of the empirical research strategy reflected participant's progression through time since the events about which empirical data was being gathered, analysed and interpreted. Participants were always aware of the actual impact of those events and it was not possible to engage with participants as events were unfolding. The empirical research strategy recognised the potential for distortion in participant's responses arising from time elapse from differing starting and ending points. Similarly, the context in which each participant engaged with the Scheme also developed in a linear forward, although not necessarily uniform, progression. Each participant engaged with APoC, proceeded through the Scheme's processes, and received benefits from involvement entirely independently from any other participant. Each participant was regarded as a discrete case because, especially in terms of time elapse, no assumptions could be made concerning the relationship between the start of engagement with APoC and prior progression towards commercialisation or achieving proof of concept, the timing of critical points in the Scheme processes (application submission, submission of proposal, award decision, receipt of grant and so on) and external events such as the development of the business economy. Irrespective of the timing of involvement in this empirical research, the time between first and final engagement with APoC for each participant varied. There was no consistency that could have led to using time as a basis for analysis that would not have also been influenced by retrospective reflection and possible temporal distortion. For example, the financial crisis and subsequent downturn in the economy began in 2008, roughly the same time that the Scheme began to operate, and also developed in linear progression. However, early applicant participants did not appear to reflect greater optimism in their engagement with APoC despite later applicants becoming increasingly aware of the impact of the

financial crisis before making their application and before accepting a grant, if their application was successful. Hence, the empirical research addressed temporality principally in data analysis and data interpretation through researcher awareness of the possibility of temporal distortion.

The nature of this research militated against adopting traditional approaches to explanatory research based on the deductive nomological or statistical-probabilistic model (Salmon, 1989). It dealt with subjects in social contexts rather than objects in natural settings, being necessarily concerned with a critical realist perspective; assuming a generative approach to explanation; accepting depth realism and recognising the validity of methodological pluralism. Two alternative explanatory approaches, describing activities to be undertaken by researchers, have been proposed by Bhaskar (Pratten, 2007, p.195-196). The first specifically concerns situations where a theoretical explanation is required and comprises four or five stages: description, retroduction, elimination, identification, (correction) - often abbreviated to the DREI(C) model. The second specifically concerns situations where an applied explanation is required and comprises five or six stages: resolution, redescription, retroduction, elimination, identification, (correction) - often abbreviated to the RRREI(C) model. In this research, the latter was more appropriate, given the context of the research.

Two alternative forms of applied explanatory model (RRREI(C) style) have been developed. Blom and Morén (2011, p.67) focus on the identification and conceptualisation of generative mechanisms, outline five stages, and bring together some of the activities included in Bhaskar's original:

Step 1. Observation/description

Step 2. Division and sorting

Step 3. Abduction/redescription/theoretical reinterpretation

Step 4. Retroduction

Step 5. Contextualization/concretization.

Blom and Morén acknowledge (2011, p.66) that their model is largely based upon an explanatory research framework, see Table 3, specifically designed for use within a critical realist paradigm that was developed by Danermark *et al.*, (2002, p.109-111).

Table 3 – The Stages in an Explanatory Research Based on Critical Realism

Stage 1 : Description An explanatory social science analysis usually starts in the concrete. We describe the often complex and composite event or situation we intend to study. In this we make use of everyday concepts. An important part of this description is the interpretations of the persons involved and their way of describing the current situation. Most events should be described by qualitative as well as by quantitative method.
Stage 2 : Analytical Resolution In this phase we separate or dissolve the composite and the complex by distinguishing the various components, aspects or dimensions. The concept of scientific analysis usually alludes to just this (analysis = a separating or dissolving examination). It is never possible to study anything in all its different components. Therefore, we must in practice confine ourselves to studying certain components but not others.
Stage 3 : Abduction/Theoretical Redescription Here we interpret and redescribe the different components/aspects from hypothetical conceptual frameworks and theories about structures and relations. This stage thus corresponds to what has been described above as abduction and redescription. The original ideas of the objects of study are developed when we place them in new contexts of ideas. Here several different theoretical interpretations and explanations can and should be presented, compared and possibly integrated with one another.
Stage 4 : Retroduction Here the different methodological strategies described above are employed. The purpose is for each of the different components/aspects we have decided to focus on, to try to find the answers to questions like: What is fundamentally constitutive for the structures and relations (X), highlighted in stage 3? How is X possible? What properties must exist for X to be what X is? What causal mechanisms are related to X? In the concrete research process we have of course in many cases access to already established concepts supplying satisfactory answers to questions of this type. In research practice, stage 3 and 4 are closely related.
Stage 5 : Comparison Between Different Theories and Abstractions In this stage one elaborates and estimates the relative explanatory power of the mechanisms and structures which have been described by means of abduction and retroduction within the frame of stages 3 and 4. (This stage can also be described as part of stage 4) In some cases one might conclude that one theory – unlike competitive theories – describes the necessary conditions for what is to be explained, and therefore has greater explanatory power (see also Chapter 5). In other cases the theories are rather complementary, as they focus on partly different but nevertheless necessary conditions.
Stage 6 : Concretization and Contextualisation Concretization involves examining how different structures and mechanisms manifest themselves in concrete situations. Here one stresses the importance of studying the manner in which mechanisms interact with other mechanisms at different levels, under specific conditions. The aim of these studies is twofold: first, to interpret the meanings of these mechanisms as they come into view in a certain context; second, to contribute to explanations of concrete events and processes. In these explanations it is essential to distinguish between the more structural conditions and the accidental circumstances. This stage of the research process is of particular importance in an applied science.

(Danermark *et al.* 2002, Table 4, pp.109-111)

(Note that the table is a verbatim copy of the table as presented in the text cited and therefore the cross reference given within the table refer to that text and NOT to this thesis.)

The Danermark *et al.* explanatory research framework was chosen as the basis for conducting the research underpinning this thesis because:-

a) it specifically addresses issues relevant to critical realist metatheory;
b) it encapsulates the core stages identified by Bhaskar in his applied explanation model;
c) it recognises depth ontology and the potentially hidden nature of generative mechanisms;
d) it includes comparative analysis.

Since deciding to adopt Danermark *et al.*'s explanatory framework a study undertaken by Meyer and Lunnay (2013), which also uses the framework for essentially the same reasons, although applied in an entirely different context, was published. Danermark *et al.*'s framework is conceptual in the sense that, whilst it is intended to guide practical research to investigate generative mechanisms, it is not intended to establish a rigid process. Rather, the focus is upon developing a valid method, which may involve reiteration and oscillation between steps. In this research the Danermark *et al.* explanatory framework has been applied mainly to data analysis and interpretation. Additionally, it provided a basis for presenting research findings (Section 5.0 - Findings). Empirical activity was undertaken to gather data prior to interpretation using the explanatory framework.

3.4 - Empirical Activity

The focus of the empirical research was the application of critical realist perspectives in identifying, gathering, analysing, and interpreting data to enable broader and deeper plausible explanation of causality, via concepts such as generative mechanisms, constraining/operating conditions, powers of objects, and tendencies. Accepting the principles of ontological depth necessarily places emphasis upon inference and the comparison of differing abstractions to develop plausible

explanations within the context of mechanisms and constraining/operating conditions that are not directly observable.

Mixed method approaches were employed, with the aim of reflecting the experiences, both successful and unsuccessful, of applicants and participants who managed APoC. This is wholly consistent with the fundamental ontological and epistemological position that recognises observed social phenomena (including feelings, perceptions, understanding, meanings, and non-tangible manifestations) as detectable expressions of outcomes in the empirical domain, arising from the activation of generative mechanisms in the actual and real domain that are not directly observable.

Defining the stance of the researcher in Blaikie's terms (2007, p.11-12) was achieved more through the recognition of what was not present, than by positive assertion that the empirical work undertaken conforms precisely to explicit criteria. It is not now possible for the researcher to become immersed in the context under investigation, since it no longer exists. Hence, the researcher was considered an 'outsider' maintaining '…*professional distance*…' (Blaikie, 2007, p.11) at all times.

Nevertheless, locating the exemplar initiative within, and understanding, the context that influences its operation remained a crucial element of this research. Context has been defined as *"The circumstances that form the setting for an event, statement, or idea and in terms of which it can be fully understood."* (Oxford Dictionaries, 2015). In this research the principal interest is in identifying the constituent elements of context as factors influencing the creation and operation of the exemplar initiative, the APoC Scheme. Hence, context is attributed causal influence in either facilitating or constraining operations. However, the dichotomy is, in practice, not as precise as this implies and when considering the range of contextual issues, it is necessary to

recognise that counterfactual argumentation or ‘what if?’ scenarios subtly alter the potential impact of context.

Social programmes are always introduced into pre-existing context whilst prevailing contextual conditions influence success or failure (Pawson and Tilley, p.69). In relation to mechanisms context is the conditions which enables mechanisms to come into operation and contextual conditioning of causal mechanisms facilitates causal potential creating outcomes. Knowledge of context is an important element in the design and implementation of any social programme. For Pawson (2013, p.37) four different levels of context are influential: impacting individuals; interpersonal relationships between individuals; institutional settings; and infrastructure. In practice, context is often equated with only the latter. In this research, the broad context describing the infrastructure in which the Scheme is located applies equally to any of the abstractions selected for analysis (see sub-section 5 – Findings) but the subtle differences in context affecting individuals, their interpersonal relationships, and institutional groupings was influential in defining the alternative abstractions.

Identifying constituent elements and understanding context in the open system that constitutes society is a challenging task and in this research, the research relied heavily upon personal interpretive, judgemental decision-making to categorise and classify factors or influences. This creates artificial boundaries around those factors or influences that are considered in some way meaningful to the research and/or the intervention being explored. The artificial boundaries serve the purpose of focusing the analysis and enabling the researcher to concentrate attention on those factors and influences considered important. Drawing inspiration from Emery and Trist (1965) and Hall (1972) the researcher initially made an assumption that every known issue is potentially a constituent of context (the environment) and subsequently, decisions were made to classify factors and influences as:

a. Specifically and directly influential;

b. General, and therefore indirectly influential;

c. Residual, and therefore not relevant.

For example, taking APoC as the focal scheme for evaluation, the provision of public sector funding was considered and classified as specific, being directly influential; the Government of the UK was classified as general and indirectly influential; and the United Nations World Development Programme was regarded as not relevant. Decisions were made by carefully weighing the evidence; asking the question whether the scheme would be in any way different if that element of context changed, and if so, would the impact on the scheme be important or minor. The basis of counterfactual argumentation assesses the degree of interrelationship between an issue and its impact on the scheme and considered the magnitude of influential change induced in by change in constituent elements of context. Two important considerations are that, firstly, as Pawson (2013, p.37) points out contextually issues are *"…infinitely complicated, intertwined and in motion."* making this a dynamic analysis that is inevitably fallible, transitive and open to constant reappraisal. Secondly, reliance upon researcher interpretation and judgemental decision-making means that the analysis is not only situationally specific to the programme, but also specific to the researcher. A different researcher presented with the same initial information, and potentially the same researcher reappraising the same information at a different time, is likely to reach different conclusions.

3.4.1 - Data Gathering

A comprehensive database recording details of all enterprises[10] engaging with APoC was maintained until final closure. Access was agreed to all spread sheets, prepared

[10] The term 'enterprise' was chosen as a convenient descriptor although it is recognised that this disguises the range of enquirers and applicants, which varied from multi-employee businesses to the

in Microsoft Excel that comprised the database. The data was entered by various people responsible for specific activities, able to access the database. Allowing a variety of people to enter data led to inconsistency and some fields were incomplete. There was no evidence of inaccuracy in the fields completed. Inconsistency resulted in small discrepancies when seeking to triangulate assessments by measurement from alternative directions using this source. For example, one enterprise was recorded in one spread sheet as having received two separate grants, but was shown in another as having made only one application and attended only one panel. Other minor discrepancies included differences between the numbers of awards made, the number of enterprises withdrawing, and the number of rejected applications seen by decision-making panels. Nonetheless, given the purposes for which the database was used, minor inconsistencies do not impact detrimentally upon the outcomes arising from the research and the database did facilitate the data gathering strategy.

This research draws upon three elements of data gathering; the first was completed prior to the commencement of this research and the involvement of the researcher. The Managing Agent used a questionnaire to gather performance data from every enterprise that drew down their full grant. The questionnaire was used again after formal closure of APoC, in December 2010, for two rounds of follow-up to track how successful enterprises had been since receiving their grant award[11]. It comprised a mixture of closed and open-ended questions, and sought mostly factual statements and quantitative data. Follow-up was designed to facilitate conventional evaluation of APoC with particular emphasis upon:

a) current position in the innovation - commercialisation process;

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self-employed, and included unemployed persons seeking to break into a market with their innovative product or service.

[11] Although grant holders were not aware of precisely when or how follow-up feedback was to be collected, and technically the feedback questionnaire was unsolicited, it was a condition of accepting a grant that data be provided on request to monitor satisfactory expenditure and progress.

b) variation in agreed project plan and target outcomes;

c) use of supplementary support services not provided through APoC;

d) change in legal format of the enterprise;

e) new patents applied for or registered;

f) new jobs created;

g) jobs deemed to have been safeguarded by obtaining the APoC grant.

The latter three quantitative measures were of most concern to fund providers. Details of the outcome of this conventional evaluation are given in Section 4.0 - APoC Scheme and forms one element of the comparative analysis central to this research.

The second element of data gathering coincided with the second round of follow-up, with the researcher inserting some additional supplementary questions into the follow-up questionnaire, appendix 1 – APoC Second Follow-up Questionnaire,[12] which focused upon three issues:

a) the perceived value of the APoC grant to each of five designated qualifying activities;

b) unintended/unexpected outcomes arising from obtaining the APoC grant;

c) changes in the strategic aims or direction of the enterprise.

The supplementary questions sought qualitative responses, although some quantitative details could be given. The postal questionnaire enabled self-reported data to be gathered from 62 grant recipients (approximately 27% response rate). Data derived from the supplementary questions was added to the database by the researcher, who personally entered, verbatim, the qualitative responses.

The third element of data gathering would, ideally, record the perceptions, opinions, experiences, and meanings of both people managing APoC and scheme

[12] The version shown here is compressed for compact inclusion in the appendices. The actual questionnaire allowed white space for responses.

participants, using open conversations. However, after conducting unsuccessful trials, it quickly became clear that researcher-prompting was needed to maintain focus and to ensure that relevant issues were probed. This appeared to be partly a function of participant enthusiasm to recount their current position in a non-reflective manner and partly a function of the time elapsed since involvement in APoC. In order to capture a more interpretive response based on personal experiences and perceptions, it was decided that personal one-to-one semi-structured interviews would be adopted, rather than using focus group discussions, questionnaire, structured interview, or interviewer administered data gathering instrument. Semi-structured interview technique injected an element of researcher control, whilst acknowledging issues of researcher reflexivity.

3.4.1.1 - Semi-structured Interviews

Using semi-structured interviews meant that it was interviewees' accounts of their experiences and perceptions that were gathered, analysed and interpreted. It did not follow that these are factual descriptions of real events, but reflect instead the interpretations, perceptions, and meanings that interviewees attach to their experiences. Whilst interviews yielded raw data, the analysis of that data yields further refined data that becomes the basis for applying techniques associated with retroduction and abduction to develop plausible explanations of the visible outcomes observed in the behaviour of actors associated with enacting and/or supporting innovation.

Since the linguistic turn (Deetz, 2003) there has been increasing concern regarding the status than can be attributed to language used by interviewees (indeed anyone) with researchers such as Alvesson and Kärreman (2000, p.138-140) querying whether language can be regarded as simply a '*…mirror of reality…'*.
Notwithstanding issues of temporal and perceptual distortion, and researcher

reflexivity, semi-structured interviews were regarded as the most appropriate empirical mechanism to adopt, with language perceived as providing accurate representations of perceptions, opinions, experiences, and meanings.

The timing of this research meant that only retrospective interviewing was possible. Successful retrospective interviewing relies heavily upon memory recall and risks interviewee memory failure, distortion, or deliberate embellishment. Memory failure is most likely when events have been 'routine' or uneventful and there is nothing unusual or extraordinary to stimulate recall. Distortion might arise from selective recall, where interviewees recall particularly positive or negative issues that reinforce perception of their overall experience. Deliberate embellishment may arise partly through interviewee desire to confirm, sometimes only to themselves, that they participated in a worthwhile activity and partly, as Lenihan and Hart (2004, p.820) point out, from the belief that positive responses enhance their prospects of participation in future interventions. In an effort to counter memory distortion, interviewees were not pressured to respond to any prompt nor discuss any issue that they did not raise themselves.

It was decided that undertaking interviews with those managing APoC would be completed prior to undertaking interviews with personnel from enterprises who had engaged with the scheme. The researcher expected that interviewees would be able to describe their experience of how APoC operated, as well as reflecting upon their experiences, the meaning, interpretation, and so on. This would enable the researcher to gain a deeper understanding of APoC, its rationale, and modus operandi prior to interfacing with those who experienced the scheme in operation.

By comparing and contrasting the understanding developed from informal conversations with APoC managers and personnel from enterprises with points

gleaned from theoretical academic and practitioner-based 'grey' literature it was possible for the researcher to prepare a guide for each semi-structured interview, whilst maintaining the general principle that interviewees should speak freely and openly, raising topics in the order in which they emerge and using language which reflects their personal experiences, feelings, perceptions and understanding of APoC[13]. Separate guides were prepared for interviews with APoC managers and personnel from enterprises and were tested by reference to two local experts and by trial interview with two volunteer enterprises. Memos (sub-section 3.4.2.3) arising from the initial analysis of interviews with APoC managers provided a basis when developing the interview guide adopted for interviews with personnel from enterprises. Incremental adjustment to data gathering based upon judgements informed by analysing earlier interviews appeared valid, while not destabilising the foundation of the exercise, leading to a lack of comparability between interviews. In some respects this mirrors basic grounded theory (Länsisalmi *et al.*, 2004), but the overall approach does not justify of the term.

It was important that interviewees were free to raise issues that had not previously been mentioned and could express their own perceptions, feelings, meaning, and attitudes in their own words, at their own pace. Nineteen areas of particular interest were identified for interviews with APoC management, eighteen areas for interviews with personnel from enterprises. The conventional style of multiple levels of prompts was used, beginning with an initial general remark to bring the point to the attention of the interviewee, to a more specific statement, and finally a direct question. Prompting was used very much as a last resort, when it appeared that a specific area of interest would not be raised. Great care was taken to interject with prompts as

[13] The interview guide was an aide memoir designed to sweep up issues not already covered towards the end of the interview. Issues included in the guide are prompts, not questions; interviews were not designed to facilitate the verbal completion of a 'questionnaire'.

infrequently as possible and not to over-emphasise issues, to avoid constraining the interviewee. Every effort was made to ensure that researcher influence was minimised and balanced with the need to tease out genuine experience relevant to the theme of this research.

On balance, it was decided not to give interviewees sight of the interview guide in advance. This has the disadvantage of not enabling quantitative data to be prepared prior to interview, but facilitates free speech by not guiding the interviewees towards pre-determined issues. Care was taken when undertaking the interviews to develop a trust relationship that, hopefully, encouraged items 'off-plan' to be brought forward.

The initial interviews were conducted with those establishing, operating, and managing APoC, collectively labelled 'Scheme Management'. The prefix 'SM' was used to distinguish these interviewees when describing and recording data specific to this grouping. Target SM interviewees were identified from informal conversations with members of the University of Warwick Science Park who were either directly or tangentially involved in the operation of APoC. Additionally, the same informal conversation enabled the researcher to build an understanding of APoC, its scope, and intended purpose.

Thirty seven potential SM interviewees were identified from scheme records. All were contacted by letter to ascertain their willingness to participate and confirm their permission to use data generated as a result of their contribution. They were also given an assurance of anonymity and asked for permission to record their interview digitally. Ultimately, fifteen agreed to take part in interviews and verbatim transcripts were prepared from thirteen recordings, each lasting between 90 and 120 minutes. Notes were prepared from one unrecorded ''Scheme Management'' interview. Another interviewee was unable to meet, but agreed to being interviewed by e-mail

over several exchanges. Collectively, the interviewees undertook a variety of roles, ranging from designing and initiating the scheme, senior administrative management, coordination, business development advice, and decision-making grant award panel member. Most roles were discrete, with very little cross-over and all the interviewees fulfilled other related roles for their employer organisation at the time of engaging with APoC; none were wholly dedicated to APoC. Appendix 2 – Scheme Management Attributes provides a schedule of their attributes.

The second wave of semi-structured interviews covered a selection of interviewees representing[14] enterprises who at least reached the stage of making a formal application for an APoC grant. For convenience, these interviewees are labelled 'Enterprises' and the prefix 'E' is used to distinguish them when describing and recording data specific to this grouping.

Enterprises were identified from the APoC Scheme database. Four principal groups of enterprises were identified: firstly, those who made an enquiry, but did not proceed with a formal application; secondly, those who made a successful application, were awarded a grant and drew down funds to engage in innovative activity; thirdly, those who made a successful application, were awarded a grant but were unable to draw down funds; fourthly, those who made a formal application but were not awarded a grant. A quasi-purposive sampling approach was adopted, ignoring the first group who had extremely limited experience of the operation of APoC. Prospective interviewees were then selected from the remaining three groups, with a view to ensuring that a variety of different experiences and outcomes were captured, but with

[14] The researcher is hesitant over using words such as 'representing', 'represent' or 'representative' because in the discourse of social science the terms have become colonised by positivists and are frequently assumed to be used in the very narrow, specific context of quantitative research meaning the particular *"…subset of a statistical population that accurately reflects the members of the entire population."* This narrow definition is never used or implied in this thesis.

no specific target in mind, other than to gather sufficient data to enable meaningful analysis.

Table 4 – Recorded Number of Enterprises

Enquirers		**Awards**		**Rejected**		**Withdrawn**	
No Detail	505						
Full Record	402	Full Record	238[15]	Full Record	29	Full Record	1
> 250	1						
100-249	2			100-249	1		
50-99	7	50-99	5				
10-49	69	10-49	39	10-49	6		
Micro	308	Micro	147	Micro	16	Micro	1
Self-employed	15	Self-employed	4	Self-employed	2		
Unknown	505	Unknown	43	Unknown	4		

The majority of enquirers were micro enterprises, mainly in the initial stages of being established to pursue a specific innovative product or service. The number of individuals associated with each enquirer was usually very small and it was decided to concentrate on interviewing the lead entrepreneur or owner-manager of enterprises who agreed to participate. This captured the views of the most influential person intimately associated with the development of the enterprise. Interviewing more individuals from the same enterprise was possible in some instances, but was avoided for fear of merely demonstrating data saturation. It is recognised that this was possibly at the expense of separately confirming the issues raised, as well as, perhaps, gaining an alternative perspective of actual events and outcomes.

The researcher expected that 'Enterprise' interviewees would both describe their experience of how APoC operated as well as reflecting upon their experiences of using APoC funding, and interpretation of those experiences. The focus was upon gaining evidence and perceptions of the contribution that APoC made to proof of

[15] Two enterprises received a second grant, but since this table records enterprises each has only one entry.

concept activity and development of the innovation. Clearly, the data was self-reported and triangulation is limited. Additionally, small, new firms often exhibit rapid and dynamic changes in status (and personnel) making it difficult to trace longitudinal development retrospectively.

Two hundred and sixty seven enterprises were identified as potential interviewees having made a formal application to APoC. Thirty-three agreed to take part in interviews, covering thirty-six enterprises[16]; twenty eight had taken up grants awarded, five concerned rejected applications, and three concerning grants offers that were not taken up. Appendix 3 – Enterprise Attributes provides a schedule of their attributes. Attempts were made to establish contact with the enterprise through the Business Development Advisor (BDA) who had handled their initial enquiry, where relevant, or through a representative of the scheme node[17] who had received their initial enquiry. It was thought that the influence of a person with whom the enterprise had already had dealings would increase the likelihood of agreement to participate. All interviewees were then contacted by letter to confirm their willingness to participate and their permission to use data generated as a result. Interviewees were also given an assurance of anonymity and asked for permission to digitally record their interview. In an effort to reduce temporal distortion arising from interviewees having received their application decision at different times, drawing down funds at different rates and being at different stages of development in moving their innovative idea toward commercialisation, interviews were spaced over as short a period as possible. Each interview lasted approximately 90 minutes, all were recorded, and verbatim transcripts prepared.

[16] Two interviews were with Technology Transfer Officers from West Midland universities who each channelled two spin-out enterprises towards APoC, whilst one interview was with the Managing Director of a company with two subsidiaries: both received APoC grants.
[17] Care must be taken to avoid confusing the use of the term 'node' in APoC and the use of the term in NVivo; see sub-section 3.4.2.1.

Verbatim transcripts for both ‘Scheme Management’ and ‘Enterprise’ interviews averaged approximately 14000 words. For this reason none are included in the appendices, but are available in electronic form on request. Printed transcripts were sent to interviewees for approval. No major changes were requested and the most common comment was the need for minor corrections to names and abbreviations (e.g. NDA meaning non-disclosure agreement replacing MDA which was ‘heard’ and typed). This is consistent with the difficulty of ‘an outsider’ researcher not being as familiar as the interviewee with their specific contextual setting. Interestingly, three interviewees objected to ‘their’ transcript on the grounds that it did not reflect ‘proper prose’. Yet the transcripts were verbatim records of speech and simply recognise that human beings do not speak in the grammatically correct, flowing English that corresponds to our self-perceptions. None of those querying a transcript withdrew their permission to take part.

3.4.2 - Data Analysis

The crux of data analysis was moving from single-level abstracted outcomes to validated multi-level downwardly-inclusive abstracted causal accounts of plausible explanations for the empirical experience of visible outcomes identified through the recorded perceptions, interpretations, meanings and actions of interviewees. Initially, analysing the available empirical data provided evidence of visible outcomes that enabled plausible explanations of the generative mechanisms, powerful particulars and operating conditions that are thought to have given rise (caused) to those visible outcome(s). Later, analysis shifted to verifying and validating the plausibility of the multi-level causal propositions put forward. Thus, empirical data analysis was not an end in itself but served as a facilitation mechanism preparing the data needed to enable retroduction and abduction to be practiced and to enable comparisons between alternative abstractions to be undertaken. It was an interim activity and

required a combination of data drawn from each of the three basic sources of empirical data described in sub-section 3.4.1.

Analysing data from the prepared database, including follow-up feedback, identified enterprises whose experience of APoC indicated they had gained a particular insight into operating conditions, generative mechanisms, and powerful particulars that may have given rise to the visible outcomes they recounted. Analysis of the supplementary questions added to the second follow-up feedback questionnaire, comprising responses from enterprises that had been able to make use of a grant although not necessarily achieving successful outcomes, facilitated a qualitative analysis of the perceived value added by APoC. Even though the supplementary questions focused upon five specified qualifying activity areas, analysis was not restricted and unintended outcomes were also documented. Details of the documented responses are given in appendix 4 – Analysis – Interpretation of Feedback

The guidance provided by Miles and Huberman (1994) and Richards (2005) was taken as the foundation for developing the analysis, since their work explicitly addresses the fundamental question "*How can we draw valid meaning from qualitative data?"* (Miles and Huberman, 1994; p.1). The volume of qualitative data generated by the interviews justified the use of computer-assisted data recording and retrieval, although the nature of the data gathered did not lend itself to automation and all the synthesis, interpretation and abstraction was solely manual. Effectiveness was demonstrated through broadening the scope of the analysis and the capacity to undertake analyses revealing patterns in the data that would not otherwise be identified. Efficiency was demonstrated not so much in the time taken to prepare and analyse data but in the speed and ease of data retrieval.

Transparency was demonstrated through the creation of a readily traceable audit trail.

The initial focus was on analysing the interviews undertaken with 'Scheme Management' interviewees. The unit of analysis was an individual with their experiences, perceptions, interpretations, and meanings captured in an interview transcript. Whilst every interviewee was representing an organisation or institution at the time of interview, the data recorded their personal experience. Their particular position vis-à-vis their organisation, of course, influenced their perceptions. For example, the particular involvement of 'Scheme Management' interviewees dictated that some responded in ways that reflected intended outcomes, whilst the response of others was skewed more towards actual outcomes, whether intended or not. The fact that APoC closed officially in December 2010 meant that all interviewees necessarily had knowledge of real outcomes, although their degree of 'closeness' to actual overall scheme outcomes varied.

The researcher's principal concern was creating an independent record of experiences, irrespective of whether these confirm or differ from the experiences of other interviewees. Data preparation included arranging transcripts so that each reflected a 'dialogue' between interviewer the interviewee. The interview conducted by e-mail (SM07) and the recorded interviewer notes from the interview where permission to record was not granted (SM05) were both regarded as one-to-one dialogue. However, the joint interview with interviewees SM10 and SM11 more closely resembled a transcript of a focus group discussion. It was necessary, therefore, to construct two separate files, each recounting the comments made by one interviewee. As expected, one interviewee tended to initiate discussion concerning a particular issue, or to lead the response to an interviewer-prompted point, with the second interviewee then joining in, usually to reinforce the point being

made. For all practical purposes the two basic data files are identical, but were analysed separately because identical analysis would be inaccurate. It was necessary in each file to include elements of the issues raised by the second interviewee to contextualise the comments and issues raised by the primary interviewee and, hence, differences in analysis are inevitable.

3.4.2.1 Coding

Coding is a core principle of the analysis of qualitative data (Richards, 2005, p.85-88), but coding and data analysis are not synonymous (Baist, 2003; p.145). Coding in this research was guided by Phillips (2002) and assisted the researcher in the identification of patterns in the data[18] (Hatch, 2002, p.155). It highlighted the intersection between actors identifying relationships and associations and identified activities that may be either the triggers for particular outcomes or outcomes themselves from other causes. In practice, most observations covered both outcomes and causes contributing to other outcomes, since only the very first and the last item in a chain of causality serve only one function. Coding also identified diachronic and synchronic associations and highlighted associations concerning places, events, and circumstances. The use of manual coding facilitated the emergence of outcomes considered significant by interviewees and recognised as relevant by the researcher. Every effort was made to avoid 'force fitting' codes to data, but it is inevitable that the researcher was influenced by existing knowledge of outcomes and issues arising from APoC, even though purposively trying to avoid this.

[18] Six characteristic patterns are found: similarities - two BDAs recounting closely matching narratives; differences - two BDAs explaining diametrically opposed meanings of the same event; frequencies – regular discussion meetings between node managers to assess progress; sequences - the appearance of a chain of events; correspondence/relationship - successful patent application followed by increased interest from external funders; and causation: - a decision to award a grant leading to the creation of new jobs.

The successful application of coding and finding suitable evidence enabled the research to move forward using abduction and retroduction to develop plausible explanations. The material being coded was primarily direct quotations, given that the principal data gathering methodology was semi-structured interview, yielding typed transcripts recounting conversations, verbatim[19]. Naturally, using text-based materials was at the expense of being unable to assess vocal inflexions directly. Field notes sought to compensate, because the interviews were not purposefully transcribed for content analysis using, for example, the Jefferson notation system.

The researcher coded and clustered the transcripts of both sets of interviews using open coding (Richards, 2005, p.71) adopting the principles of data condensation advocated by Miles and Huberman (1994). The process was managed using NVivo 10[20], adopting the protocols established by Saldaña (2009). The researcher made use of repeat coding to establish credibility, transferability, dependability, and confirmability, as advocated by Lincoln and Guba (1985). Over time repeat coding assisted in developing a rich understanding of the participants, meanings and the significance that they attach to the data (Pratt, 2009, p.859). To avoid subtly altering the researcher's perception of the data it was decided to complete all interviews before any data was coded, despite a strong recommendation to code as data is being collected (Saldaña, 2009, p.17).

Open, or emergent, coding was adopted. No codes were identified a-priori; codes were created to reflect issues and points as they emerged from interview transcripts.

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[19] NVivo would permit coding to be undertaken directly from the audio recordings that were made for most interviews. However, researcher preference is to code transcripts because audio is not available in every instance; the researcher perceives great consistency and subsequent reliability in data retrieval using principally text-based source material; and further, deeper analysis is considered by the researcher to be more reliable using a single type of source material.

[20] Early interviews were coded using NVivo 9 prior to transfer to the up-dated version shortly after launch of NVivo 10. All analysis was conducted using the up-dated version. NVivo was not a substitute for researcher decision-making in coding and clustering data, but facilitated more rapid, efficient analysis of large quantities of interpretive data.

This avoided constraining the analysis to pre-conceived ideas, allowing points of importance to the interviewee, rather than points dictated by the researcher, to be coded. Open coding relies heavily on researcher intervention and facilitated multi-level analysis, since the researcher employed a series of iterative cycles, each cycle progressively investigating deeper levels of meaning and interpretations until data saturation was reached. The purpose was to identify recurring patterns and consistencies and hence, whilst not prescribing what those should be, one element of interpretation was to ask whether there was evidence of a consistent, repetitive pattern[21]. As coding proceeded the researcher attempted to codify meaning, interpretation, and importance. This meant that at more advanced, deeper levels, the codes really reflected the double hermeneutic nature of analysis: the researcher's interpretation of the interpretation of an experience recounted by the interviewee.

A four-pass coding strategy with four primary nodes (descriptions, interpretations, evaluations, and explanations) was developed and applied by the researcher when analysing the transcripts of interviews with 'Scheme Management' interviewees. Firstly, descriptive coding enabled the grouping of material associated with the same issue, or experience. After coding all the transcripts using descriptive codes, the material was grouped by descriptive node and the process repeated, coding with interpretation codes. Secondly, interpretation coding deduced the meaning of the experience and enabled differing perspectives (meanings) to be grouped together. Emphasis in the second cycle was placed upon recovering the interviewee's interpretation, not on imposing the researcher's interpretation, nor in extending interpretation to the researcher's interpretation of the interviewee's interpretation. Care was taken to ensure that grouped material coded with the same descriptive code did not lead to an assumption that it was to be coded with the same

[21] It is reasonable to anticipate that all node managers, for example, might have very similar experiences and therefore raise similar issues.

interpretation code. It does not follow that any given interpretation code can only draw material from a certain descriptive code and openness to any form of interpretation, from any source, was maintained. Thirdly, evaluation coding ascertained the significance of the meaning ascribed to the experience and grouped together material that had apparently similar importance, especially where there was also an association with the person or group to whom importance was attributed. Finally, explanatory coding identified the plausible causal conditions giving rise to the experience.

A six-pass coding strategy, mirroring that applied to the 'Scheme Management' transcripts but with the explicit addition of abduction and retroduction as nodes, was applied when analysing the transcripts of interviews with 'Enterprise' interviewees. Care was exercised to ensure that progressive data reduction did not eliminate material too early, before relevance to deeper levels of analysis had been ascertained. Neither was the researcher too hasty in deciding what interpretation, meaning, or explanation was correct. Codes that survived several iterations were probably the most robust, enduring, and important.

Fifty-seven active data codes were identified in the analysis of 'Scheme Management' interviews and fifty-nine in interviews with 'Enterprises'. Differences, and the researcher's interpretation of equivalence, in the codes applied to the two groups are shown in appendix –5 – Equivalence in Code Application. Clearly, 'Enterprises' had no experience of the planning, development and management of APoC and consequently, only 'Scheme Management' raised issues that required codes in those areas. 'Enterprises' had more experience of the outcome and impact of the scheme and consequently, whilst there are codes common to both, fewer issues were raised by 'Scheme Management'.

The coded transcripts from both groups of interviewees constitute the principal source of empirical data for analysis using retroduction and abduction. Appendix 6 – Node x Scheme Management gives details of the number of coded references by node for 'Scheme Management', whilst appendix 7 – Node x Enterprise Table gives similar details for 'Enterprises'. A coded reference is not necessarily directly equivalent to a verbatim quotation, but a verbatim quote is likely to comprise at least one coded reference, although it may include multiple coded references.

In each cycle of coding and iteration the research engaged in 'lumping and splitting' (Saldaña, 2009, p.19-20), to reflect developing understanding of the source material and researcher interpretation. Material perceived as meaning the same thing, but which had originally been given independent codes, was 'lumped' together (clustered together); sometimes under a new code, sometimes under one of the existing codes. Alternatively, some data was redefined as 'belonging' to the same parent node as apparently similar data. Equally, material initially grouped together subsequently not considered to concern the same point needed to be 'split' to create two or more codes. This achieved a finer grade of analysis.

Data condensation and clustering established certain recurring perceptions and opinions which were believed to be indicative of generative mechanisms and structural/constraining conditions that influenced actions taken in response to receipt (or non-receipt) of APoC funding. Analysis of individual nodes (people's statements) was interpreted as identifying perceptions and opinions that relate specifically to the particular circumstances of the individual. Perceptions and opinions were indicative of issues influencing individual decision-making in determining the actions/behaviour in which the individual subsequently engaged.

Appendix – 8 – Example of Coding provides an example of coding a transcript, drawn from the interview with interviewee SM09. The discussion concerned the speed of moving from enquiry to grant decision. At the risk of taking an extract out of context and 'forcing' coding for illustrative purposes, the appendix includes elements that could be coded to each of the four different levels of coding that comprise the basic coding strategy. The layout does not exactly replicate the result of coding as it appeared using NVivo: the example is to illustrate the principle of multi-level coding.

The critical point to note is that coding itself does not bring out the meaning or interpretation of the issues tagged as significant. For example, it was necessary to look beyond coding to interrogate the data in more depth. Why does 'it had a slow start' indicate that pace might have been affected (in this instance, probably adversely)? The comment concerning not being a loan seems to infer that the interviewee feels that there is less commercial pressure to act quickly with the implicit consequence that the speed of processing is not as quick as it might have been. This illustrates that data coding was preparatory, helping the researcher reach into the data and the circumstances pertaining to the situation which the data describes in order to search for meaning.

Ryan and Bernard (2003) suggest that one of the primary difficulties during post-coding data analysis is trying to ensure that the coding framework adopted has satisfactorily identified the themes arising within the data. In an adaptation of advice originally developed by Strauss and Corbin (1990), they listed twelve characteristics of data that had been coded satisfactorily. The satisfactory identification of themes relies upon coder/researcher consistency and reliability. All coding and analysis is the product of a single coder/researcher and whilst this ought to mean consistency this is not necessarily synonymous with the absence of error or bias.

3.4.2.2 - Field Notes

Coding was assisted by strong field notes compiled by the researcher during interviews. The field notes annotated the interview recordings with comments concerning issues such as the use of irony, humour, facial expression, and gestures not necessarily revealed within the voice inflexions in the recordings and transferred to the transcript. The researcher realised that the field notes compiled during interviews with 'Scheme Management' interviewees were not as comprehensive as they needed to be and did not fully record potentially significant points concerning the actual behaviour of interviewees. Field note taking was improved significantly in later interviews with 'Enterprise' interviewees. Appendix 9 – Field Notes is an example of field notes compiled by the researcher during interviewing.

Similarly, compiling 'margin notes' simultaneously with coding was extremely helpful in recalling emergent issues for later analysis and was used in all coding iterations for both groups of interviewees.

3.4.2.3 Memos

During coding it was necessary to delve below the minutiae of coding to gain an understanding of the deeper, more conceptually coherent pattern of events and experiences that emerged from the data. The technique known as 'memoing' was used by the researcher in more or less the pure sense of Glaser's (1978, p.83-84) original meaning:- *"…the theorising write-up of ideas about codes and their relationships as they strike the analyst while coding……it exhausts the analyst's momentary ideation based on data with perhaps a little conceptual elaboration."* Appendix 10 - Memoing is an example of memoing as compiled by the researcher during coding.

Memos were much longer than margin notes and included more reflective analysis and evaluation; the latter were shorter, drawing attention to a specific point. Memos acted as an aide memoir during coding and subsequent analysis. Memos were written during all four coding levels and during most iterations, although not every transcript led to the type of realisation that required a memo. Some reflected simple groupings of related concepts, others reflected clusters indicative of the operation of plausible causal mechanisms that might explain a specific visible outcome. Memos reminded the researcher of the perspective taken that, over time, traced the development of themes of enquiry for deeper interpretation. One of the advantages of basing data analysis on NVivo was the facility to develop explicit links between the content of interview transcripts and memos enabling source material to be reviewed when undertaking data interpretation, (Section 5.0 - Findings).

3.4.3 - Data Interpretation

Combining the analyses of data from three data sources identified commonalities interpreted as indicative of shared experiences. The researcher prepared an interim summary with the primary emphasis on justifying plausible multi-level abstractions. These reflected prominent 'effects' arising from 'causes' (generative mechanisms, powerful particulars, and operating conditions) thought to be influential at deeper levels. However, the interim analysis did not necessarily compare the totality of actual outcomes; some outcomes may not been visible or may not have been experienced.

Data gathered by the Managing Agent was used to carry out conventional evaluation of APoC. Although not conducted by the researcher, conventional evaluation provided the comparator central to this research. The researcher's interpretation of the data analysed in conventional evaluation was important and was reported and discussed in Section 4.0 - APoC Scheme. Data gathered *inter alia* the second

feedback questionnaire was analysed by the researcher using simple frequency analysis to indicate shared outcomes. Details of this analysis and interpretation are also given in Section 4.0 – APoC Scheme. This sub-section focuses exclusively on the interpretation of issues emerging from the coded analysis of interviews described in sub-section 5.3.2. The purpose is to describe and justify the approach taken to data interpretation; the results are detailed in Section 5.0 - Findings.

The substantive effect of critical realist metatheory is found in terms of data interpretation, which differs markedly from both objectivist/positivist and phenomenological empirical research. There was no prescribed methodological stance for engaging in data interpretation. The researcher's aim was to infer the best possible explanation of what conditions must have existed and what mechanisms operated to produce the visible outcomes and experiences recounted by the interviewees. Undertaking comparative analysis between intentions and actual occurrence does not necessarily establish that outcomes are the direct effect of intended intervention. In this research the documented experiences of participants identified events and outcomes which may have arisen from mechanisms activated as a result of the outcome of an APoC grant.

Abduction and retroduction guided the researcher: both led to multi-level investigations conducted in a 'bottom-up' manner, building from participants' experiences and the meanings they attached. The crux was deriving ampliative inference from the various clues hidden within the analysis.

3.4.3.1 - Abduction

Abduction, originating from Pierce (1932), is one of four specific styles of inference (deduction, induction, retroduction, and abduction) and concerns mainly social constructions (an entity with no realist object that is created entirely by human

interaction, for example, meanings and truth). It may simultaneously take a defined logical form; build from a position of a core element of perception; it may also, as here, be considered re-description or reconceptualization of an observed phenomenon (Danermark *et al.*, 2002, p.89-95). It enables the identification of outcomes from circumstances and structures that are not directly detectable from empirical data. Meyer and Lunnay (2013, p.2) commented that, despite its power to provide innovative insights and contribute to explaining visible phenomena, because it draws heavily upon data rejected by conventional modes of inference abduction does not receive the attention it deserves.

Abduction shows that a specific instance represents a plausible, but not logically necessary or definitively certain, conclusion arising from the application of a frame of reference to produce a defined result. Abduction only remains valid whilst the frame of reference is held to be correct, although it may be one alternative and the interpreted outcome may be only one of several alternative interpretations. Whilst abduction always facilitates new insights, not directly observable and hence, not being capable of being confirmed empirically, the insight generated is inevitably fallible. Abduction considers possibilities, whereas deduction appears to address certainties, but only within the scope of existing theory. For example, as reported in sub-section 5.1.3 - Outcomes interviewee E30 showed that whilst identified in advance as an anticipated outcome, receiving the grant was interpreted as an endorsement from knowledgeable experts, meaning that the proposed project had potential for successful development.

Abduction facilitates moving from one conception of something to an alternative. Similarly, re-contextualisation, which may comprise any or all observations, descriptions, interpretations, or explanations, may take place within the frame of reference of completely new contexts. This does not produce new events; rather it

produces new meaning to known events. For Danermark *et al.* (2002, p.93), all abduction is built upon creativity and imagination, especially the ability to perceive new associations amongst descriptions. For Meyer and Lunnay (2013, p.3), relationships within empirical data are highly significant in observing issues embedded within data, but which cannot be reduced to empirical findings - "*Re-description and re-contextualisation…give new meaning to already known phenomena and help social scientists to understand previously taken-for-granted phenomena in a novel way."* Meyer and Lunnay (2013, p.13).

3.4.3.2 - Retroduction

Retroduction continues the theme of explicitly reflecting approaches in social sciences, where closed experimental conditions cannot be created and would not reflect reality. It provides a plausible explanation of an observed phenomenon in terms of necessary conditions, structures, mechanisms, powerful particulars, trigger events, and contingent circumstances. Intertwined within fundamental structures and mechanisms are the behaviours and interactions between actors in the scenario. Retroduction is a style of thought experimentation using inference to hypothesise hidden generative mechanisms (e.g. - innovation mechanisms) that could/must have been present to give rise to observable outcomes. The researcher begins with the known - an observed or detected experience (e.g. - a decision made by an entrepreneur). Next the researcher postulates what unknown conditions must be present in the real domain and actual/events stratum (e.g. – the absence of public sector funding for proof of concept activity). This exactly describes the process undertaken by the researcher in this instance.

Retroduction seeks to identify and explain the causes of observed regularities in terms of structures and mechanisms (Blaikie, 2007, p.83). Whilst Blaikie stressed regularities, the researcher perceived retroduction as a valid approach to data

interpretation for this research, even though no regularities occurred and only demi-regularities are possible, because it recognises the validity of depth ontology and the occurrence of unobservable generative mechanisms or partially obscured elements therein.

Like abduction, retroduction is a mode of inference, and was described by Meyer and Lunnay (2013, p.2) as an "…*under-utilised methodological tool…".* It differs significantly from other modes of inference because it does not possess formalised, logical characteristics. Instead, it is described as a *'…thought operation…'* (Habermas, 1972, p.113; Danermark *et al.,* 2002, p.96) facilitating movement from knowledge of one 'thing' or entity to knowledge of another. The basis of retroduction is to use *a priori* knowledge to move away from theory to extend and progress beyond empirical observations (Meyer and Lunnay, 2013, p.4).

Social science researchers use retroduction to identify, interpret, and understand the fundamental characteristics of general structures. Retroduction is not limited to research employing critical realism, but draws heavily upon depth realist ontology and neo-realist epistemology, which are central to critical realist metatheory. This explains why retroduction is central to this research and was one of the fundamental approaches.

The fundamental activity undertaken by researchers in retroduction is transcendental argumentation that clarifies the prerequisite conditions for social relationships - actions by agents (people), reasoning, and knowledge. Transcendental argumentation is sometimes known as transfactual argumentation because it reaches beyond empirical observation into deeper strata. Transfactual argumentation differentiates between necessary conditions, which must exist for a phenomenon to be observed, and contingent circumstances, which exist in particular

instances but are not essential to the existence of the observed entity. Retroduction moves from empirical observations, remembering that, as highlighted by Danermark *et al.*, 2000, (p.95), empirical observations are not synonymous with real entities, to a conceptual understanding of transfactual conditions. In essence, retroduction seeks to attain knowledge about internal relationships that constitute a phenomenon and without which the phenomenon would take a different form. The underlying structures and mechanisms constituting necessary conditions and contingent circumstances are embedded within a milieu of intricate composite relationships. This further accentuates the difficulty for researchers because it is impossible to isolate a phenomenon from the intricate relationships in which it is embedded without running the risk of ignoring potentially significant influences. Additionally, intricate composite relationships are dynamic and analysis must take place in four dimensions to reflect changing circumstances when suggesting plausible explanations.

3.4.3.2.1 - Separating Necessary Conditions and Contingent Circumstances

Danermark *et al.* (2002, p.100-106) highlight five approaches to separating necessary conditions from contingent circumstances:

a) counterfactual thinking;
b) social and thought experimentation;
c) exploration of pathological circumstances;
d) extreme examples,
e) comparative analysis.

They emphasise that the five approaches are mutually supportive, rather than conflicting, and, ideally, are applied collectively, rather than being applied individually or sequentially in any given study.

The first approach, counterfactual thinking[22] (p.101), concerns reflection on alternative realities in contrast to reality as experienced. In this research, the researcher considered whether different outcomes could have arisen had there been access to private sector sources of funding for assessing proof of concept. The key point is that the counterfactual is plausible – a believable possibility within known contextual influences – avoiding purely hypothetical speculation of unlikely alternatives. This relied heavily upon researcher experience of context in making appropriate judgements. Counterfactual argumentation/thinking is essential to any research, especially social sciences, where classical experimentation is not possible (Tetlock and Belkin, 1996, p.6). Six criteria said to be useful in judging the quality of counterfactual argumentation are suggested (Tetlock and Belkin, 1996, p.18). Unfortunately, these are rather positivistic, favouring objective ontology in classical experimentation and are, therefore, particularly problematic in social sciences given its recognition of an 'open systems' perspective, and wholly inappropriate within this research.

In counterfactual argumentation, something is understood by contrasting what it is with what it is not; presence and absence are constitutive of one another and current understanding of reality can be enhanced by considering opposites; light and dark, or noise and silence. This form of reasoning is known as dialectical argument (Hartwig, 2007, p.129-130) and in this research it was important to understand the necessary conditions, implications, and outcomes of providing a grant, rather than a loan, in the contingent circumstances of bridging a funding gap. The researcher acknowledged that APoC provided a grant, but needed to think through the implications of what the scheme would have been if it had not awarded a grant. Perhaps APoC could have awarded a loan, or capital investment warranting a return, or, possibility it might not

[22] When applied in practice, counterfactual thinking is often termed 'counterfactual argumentation'.

have been able to award anything at all? This type of thinking underpins the commonly experienced personal emotion of post-decision regret. Later reflection on a decision already made and enacted appears less satisfactory than hypothetical experiences that might have arisen (Coricelli and Rustichini, 2010).

Danermark *et al.'s* second approach (2002, p.101-104), social and thought experimentation, concerns disruption to the norm and the exploration of the responses and approaches to restoring accepted order. Garfinkel (1967, p.44)[23] demonstrated that it is often enough to imagine disrupting the norm, without actually doing so, to ascertain necessary and contingent conditions. To identify causal mechanisms and their outcomes requires that social and thought experimentation are combined with transfactual argumentation; knowledge of constitutive conditions cannot be obtained empirically or by observation in many social contexts. Additionally, as the well-known Hawthorne Effect demonstrates (Landsberger, 1958), experimental conditions in social sciences tend to induce an a-typical response in subjects, since they are aware of being the focus of experimentation. The interpretive nature of social science lacks the axiomatic systems characteristic of quantitative sciences, thus rendering counterfactual argumentation based upon thought experimentation open to the criticism of providing 'only one view' that cannot be confirmed beyond reasonable doubt.

In this research, the researcher imagined disrupting the norm by removing the structural condition imposed by defining target industry sectors. Opening APoC to applicants from any sector would give the decision-making panels the opportunity to support the strongest applications that might help achieve the stated objectives in terms of job creation/protection. However, to do so might have decreased the

[23] Better known for his work on language to demonstrate the importance of taken-for-granted assumptions in everyday conversation.

opportunities for weaker applicants in the stated target sectors. The contingent conditions might have been that the overall standard of applicants rose as applicants sought to prepare their best possible case for the BDA to present. Other contingent effects could have included a loss of focus and specialisation, since BDAs who specialise in a wider range of sectors would be needed. Alternatively, specialisation might increase as node managers needed to recruit more BDAs who specialise in sectors currently outside the target groupings. As this example illustrated, thought experiments quickly develop a range of plausible outcomes, contingent needs, and possible implications. Judgement was needed to decide which outcomes were most likely to occur, had the situation developed in the way imagined.

Danermark *et al.'s* third approach (2002, p.104-105), exploration of pathological instances, concerns the study of situations where social conditions and generative mechanisms appear accentuated and, therefore, more readily observable. There is a close similarity with social and thought experimentation; the normal circumstances or conditions are challenged or disturbed, but the fundamental difference is that under pathological conditions the challenge or disruption occurs naturally. It is not 'forced' by a researcher or experimental circumstances. Often, under challenge, generative mechanisms that may otherwise be counteracted by other mechanisms cannot be diluted or dissolved and, hence, become highly visible.

APoC assumed that grant holders would implement their action plan as outlined in their grant application. Some were unable to do so and 'challenged the norm' by seeking variation to agreed timescales or expenditure limits, or sought to transfer fund allocation between qualifying activity. APoC appeared to be operating within tightly defined parameters having precisely defined target industry sectors, specified qualifying activities and requiring an approved activity plan as part of each grant application. However, flexibility was shown because requests for variation to deal

with unforeseen circumstances and events were readily accepted. The attitude displayed was welcomed and appreciated by enterprises. The difficulty for the researcher is distinguishing between 'normal' and 'pathological' circumstances and again, judgement was needed.

Danermark *et al.'s* fourth approach (2002, p.104-105), exploration of extreme case examples, concerns the study of situations in which necessary conditions and contingent circumstances appear in their purest form. A typical example in social sciences would be when studying ritual behaviour, where social interaction is habitual and compulsive, often highly regulated by shared beliefs.

APoC comprised an overall framework that sought to regulate behaviour and interaction, but which was applied more as a loose guide than a rigid template. Actions taken by individuals that conformed to the framework were also congruent with shared values associated with providing support for innovation, but at the same time, sought to make effective use of public funding to produce outcomes that benefit the region. The conduct of the decision-making panel meetings had the characteristics of ritualistic behaviour, where following the established pattern was an element of ensuring equity in justifying decisions made. An extreme case was identified of an applicant, for whom the award of a grant genuinely made the difference between survival and abandoning the project. Interviewee E29 recounted how it was only the grant that had kept their project alive. They did make it very clear, however, that the project was likely to close imminently in the absence of follow-on funding.

The final approach put forward by Danermark *et al.* (2002, p.105-106), comparative analysis, concerned the analysis of parallel examples to identify similarities and differences. The researcher explored the empirical data in several different

dimensions, but comparison was the leitmotif. For example, comparison between the principally quantitative data in the database covering specific enterprises who enquired about APoC and whose progression through the process occurred at differing rates and reached differing ends. However, more significant comparison was drawn between the experiences and perceptions recorded from Scheme Management and Enterprises concerning specific issues, such as the early withdrawal of APoC.

3.4.3.3 – Applying Abduction and Retroduction

The basic outcome from applying abduction and retroduction is the creation of a conceptual model, or theory, of the causal influences and their interrelationships, expressed in the form of interacting causal mechanisms (for example, desire for independence versus the ability to sustain self-employment) and powerful particulars that may give rise to an observed phenomena. Full details of the findings are presented in sub-sections 5.3 – Stage Three – Abduction /Theoretical Redescription and 5.4 – Stage Four - Retroduction. Theorisation is needed in developing plausible explanations for observed outcomes because of the inability to directly observe cause in operation inherent in the ontology of depth realism. Research culminates with an assessment of the explanatory power of each abstraction, statement, or theory of plausible causal influence, based upon the use of empirical evidence to assess relative appropriateness.

Experience/observation facilitates speculation concerning the circumstances and/or conditions that must exist to give rise to the observed outcome. Unlike conventional forms of theorising neither abduction nor retroduction confirms or refutes any given speculation. The number of times an outcome is observed is neither proof nor the absence of proof that a particular plausible association is actually present.

An example drawn from this research concerned risk associated with innovation. Any form of innovation contains an element of risk that the entrepreneur/innovator typically envisages as a financial consequence that may be expressed as a direct cost to the individual/venture, a lost opportunity to use resources on an alternative project/activity, a loss of reputation and credibility, and so on. In this instance retroduction from visible outcomes inferred that the generative mechanism of preventing harm to self was influenced by providing an APoC grant that restructured the situation so that the financial consequence of risk was either eliminated or reduced for the entrepreneur/innovator. Associated evidence from interviews showed that only a grant could achieve this, because mainstream alternatives, a loan or resourcing from internal sources, places 100% exposure to financial consequences on the venture/individual. Equity finance from a partner investor might have led to risk dilution but involved sharing ownership and control in ways not acceptable to the entrepreneur/innovator at that point. Abduction inferred that the grant had a twin influence on the perception of the entrepreneur/innovator. Firstly, their attitude toward the timing of risk changed, such that decisions exposing the venture/individual to risk were brought forward and put into action at an earlier stage in the life of the project; secondly, the grant functioned as a form of 'insurance', transferring risk to another party and changing attitudes towards the size of exposure deemed acceptable and, hence, facilitated decisions being made that increased the level (size) of exposure to financial consequences.

The very limited number of examples of the practical application of retroduction and abduction differ significantly, but generally concur that it is necessary to undertake comparative evaluation of alternative abstractions to identify best available explanations (Houston, 2011; or Ward and Gimbel, 2010; or Martin A, 2009). The criteria for determining best available explanations are contextually specific. Grüne-Yanoff (2013, p.850) contended that a common philosophical approach to appraising

a model concerns the extent to which it is representative of an element of reality. This is based on an assumption that the characteristics of the model and the reality that the model seeks to replicate can be independently verified and shown to be similar. The degree of similarity is then a statement of the explanatory capability of the model. A heuristic model can never be identical to reality and the question remains, how similar is similar enough to be useful?

4.0 - APoC Scheme

This section has three aims: to expand upon the details of the APoC scheme given in Section One – Introduction; to report the principal findings from the conventional evaluation undertaken by the Managing Agent; to report the findings of the analysis and evaluation, undertaken by the researcher, of the supplementary questions added to the second follow-up questionnaire. This section changes the emphasis from establishing the background theoretical and methodological perspective to establishing the evaluation outcomes that form one element of the comparative analysis underpinning this research.

The quantitative data given in this section was drawn from three sources:-

a) the central database of enterprises engaging with APoC, previously described in sub-section 3.1- Influence of the Sciences;
b) unpublished internal scheme documents accessed by the researcher in October 2010 and March 2012, all regarded as commercially confidential;
c) the Advantage Proof of Concept Fund: Final Report compiled by the Managing Agent at 31st March 2011; marked “Commercial in Confidence”.

As indicated in sub-section 3.1 there are small inconsistencies between the data recorded in these sources that the researcher has been unable to resolve[24]. None of the discrepancies are considered detrimental to the principal findings developed during the course of this research.

4.1 - Aims and Objectives

Drawing upon Weiss (1998a, p.7), APoC could be considered a ‘project’ within a National programme of support for innovation and was created to address one

[24] For example, two enterprises are each recorded as making enquiries, going through the full process and receiving a grant. However, both are recorded as receiving a second grant but it is not clear whether this results from a second application or should be regarded as a second instalment arising from a single approval process.

influence on innovation present throughout the UK, and two regional difficulties in the West Midlands. It was recognised nationally that enterprises with innovative ideas find it extremely difficult to provide sufficient funding internally and to raise external finance to commercialise technology-based new products, services and processes (BIS, 2008). Within the West Midlands it was noted that *"Currently year-on-year spending on R&D is falling and levels of total investment in the region are now the lowest of all English regions."* (Paul and Smith, 2008, p.53). Additionally, two earlier schemes had closed and an independent evaluation of one had noted *"In the light of market failure now evident, there is a case for intervention to continue…"* (Grindrod, 2008, p.2). The intention of the scheme's designers was to facilitate the commercialisation of innovation in the West Midlands by contributing to meeting the needs of local enterprises left unfulfilled by private sector finance provision, with the expectation of boosting local economic growth and development.

Grindrod (2008, p.1) indicates that the purpose of the scheme was: "*To enable universities, established and start-up businesses to investigate, advance, and protect early-stage innovative business ideas, better equipping beneficiaries to engage in further development and subsequent commercialisation."*. The objective was crystallised as supporting proof of concept activity in the early stages of commercialising innovations by targeting both existing and start-up enterprises, officially defined as SMEs, and spin-out ventures from universities in the West Midlands. It was made clear that support was intended to assist the eventual commercialisation of innovation; the scheme, therefore, targeted five activities considered particularly influential in the transition from innovative idea to commercially viable product, service, or process. These were: market assessment; intellectual property rights (IPR) protection; business planning; basic prototyping; and management support. Designating these activities as 'qualifying activities' was not intended to indicate that these were necessarily the activities required to

commercialise any specific idea; nor was it intended to indicate that only these activities were needed. Rather, it was indicative that these were areas where enterprises might incur external costs that could be evidenced relatively easily (by sub-contractor invoice for materials or services) and applicants should emphasise these activities in their commercialisation plan, which had to accompany grant applications.

Building upon these broad objectives, a number of specific aims were defined as planned outputs expressed in quantitative form. Selected aims were designated Key Performance Indicators (KPIs) and included items such as number of enquiries generated, applications, grant awarded, patents registered, jobs created and safeguarded, new products launched, and funding provided. Comparing actual performance against designated key performance indicator(s) was the basis of the post-scheme conventional evaluation undertaken by the Managing Agent.

4.2 - Operation

The Managing Agent coordinated operations and was responsible for marketing, designing and implementing administrative procedures, and developing supporting documentation to ensure equitable treatment of enquiries, applications, and awards. Four other nodes[25] were appointed under the Managing Agent, to provide a devolved implementation service for the entire region. Each node was an experienced provider of innovation and commercialisation support services, with specialist interest in particular sectors. All had experience of managing ERDF projects and general grant funding. Each integrated their own network contacts into APoC to assist in marketing and local promotional activity.

[25] Use of the term 'Node' in APoC should not be confused with use of the term in coding qualitative data.

The nodes, including the central node where the Managing Agent was based, were responsible for dealing with initial enquiries and allocating a Business Development Advisor (BDA) to work with eligible enquirers in preparing their initial application. Outline applications were scrutinised by the Managing Agent who undertook due diligence and eligibility verification. Assuming progression to the next stage, a BDA would be allocated to spend up to one day working with the applicant to prepare a full application and ensure that they had the required funding contribution available. The BDA then presented the finalised application to a sub-regional decision-making panel. Successful applicants were contracted with the scheme; unsuccessful applicants were given supportive advice and sometimes invited to re-submit a revised proposal.

The decision-making sub-regional panels comprised invited members, broadly representing regional stakeholders, including representatives of enterprises. Members were chosen for expertise and commitment to the region and were regarded as knowledgeable, respected members of the community who could command respect among applicants. Central to decision-making was a standardised 10-criteria commercial opportunities appraisal process and the priority of panel members was to select projects which were rated as low risk, high impact.

APoC approved grants totalling £6.38m for qualifying enterprises, which subsequently drew down £5.29m. The scheme's operating cost was less than 20% of the total funding available. The maximum grant that could be awarded was £30,000, to cover external costs of up to 75% of the projected cost of the proposed innovation. Successful applicants were required to contribute the remaining 25% from internal finance or independent external sources. Grant payments were made retrospectively upon receipt of invoiced proof of expenditure.

4.3 - Coverage;

Adopting devolved implementation procedures was important in satisfying expectation for even coverage across the region.

Figure 9 – Location of Nodes

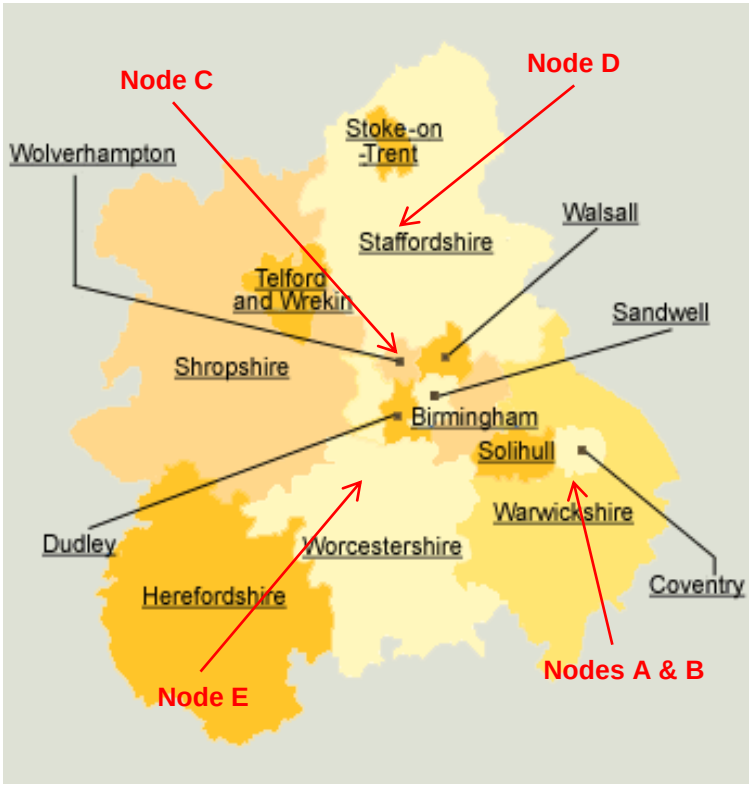


Figure 9 shows that nodes were located near regional population centres, leaving rural expanses to the west apparently exposed.

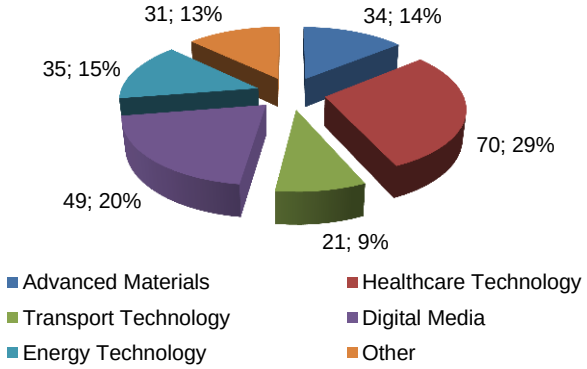
Table 5 shows that all nodes exceeded their target for enquiries. Nodes B, C, and D failed to meet expectations for applications, whilst nodes B and C were not successful in achieving their award target. Overall, however, performance exceeded expectations. The Managing Agent explained sub-regional variations in achieving targets as being due to structural issues, such as the disproportionate number of technology businesses in urban areas, the proximity of universities to areas of enterprise activity, and variations in infrastructures, including the 'A34 corridor' effect, encouraging ribbon development.

Table 5 – Key Performance Indicators (KPI) - Achievement of Nodes[26]								
	Enquiries		Outline Application		Full Application		Awards	
Node	KPI	Actual	KPI	Actual	KPI	Actual	KPI	Actual
A	111	114	n/a	85	42	66	34	58
B	230	290	n/a	151	88	81	72	64
C	214	223	n/a	100	65	52	53	47
D	81	138	n/a	60	37	35	29	33
E	81	142	n/a	63	42	42	33	38
Totals	717	907	n/a	459	274	276	221	240

(KPIs from Advantage Proof of Concept Fund: Final Report 2010/2011)
(Actuals from Advantage Proof of Concept Fund Database – May 2011)

Additionally, APoC purposively targeted 'priority sectors'; industry sectors perceived to provide the best opportunities for the development of sustainable businesses including advanced materials; healthcare technologies; transport technologies; digital media; and energy technology. Figure 10 shows the distribution of grants and the emphasis on healthcare technology and digital media.

Figure 10 - Grants Awarded (Number; Percentage) by Priority Sector



(Advantage Proof of Concept Fund: Final Report 2010/2011)

Some applications were clearly drawn from outside the priority sectors and, as the interview with one Scheme Manager confirmed[27], all applications thought to offer potential were supported. Received applications were divided into thirty categories using standardised (self-identified) sector codes, but seventeen database entries

[26] The data given in this table is derived from the Advantage Proof of Concept Fund Database May 2011. The figures differ from those given in the Advantage Proof of Concept Fund: Final Report 2010/2011. For example, the former records 907 enquiries but the latter shows only 896 enquiries being received.

[27] *"…if you come across somebody or a company with something that you judge to be valuable and that ought to be supported, then the game is trying to present it in a way that it ... it fits those criteria. And ... and in practice…." you know, you can ... you can make almost anything fit almost anything…"* SM13.

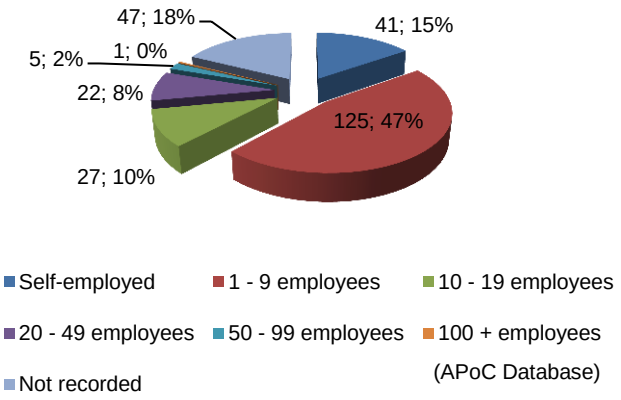
were absent. It is not clear exactly how the thirty categories relate to the five priority sectors. The top five categories accounting for approximately 48% of applications are shown in Table 6.

Table 6 - Applications by Standardised (self-identified) Sector	
Sector	**No. of Applications (% of total applications)**
Healthcare	62 (13.50%)
IT & Multimedia	52 (11.33%)
Manufacturing	47 (10.24%)
Energy Efficiency	33 (7.19%)
Learning & Development	27 (5.88%)
Overall	**221 (48.15%)**

4.4 - Analysis of Grant Applicants

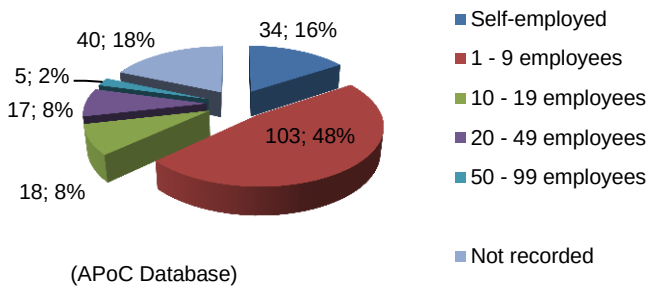
APoC attracted applicants whose proposal mainly concerned technology-based innovation and many applicants were working towards creating a new commercial venture, if not an entirely independent new business.

Figure 11 - Number of Grant Applicant Enterprises x Number of Employees



Although APoC did not explicitly limit applications to smaller firms or self-employed individuals, in practice, the majority of applicants fitted these categories. In fact, no active grant holder had more than 87 employees (Figure 11). A similar pattern is apparent in the number of active grant holders (Figure 12). Unfortunately, the database record is incomplete, with no figure for number of employees for over 18% of grant applicants.

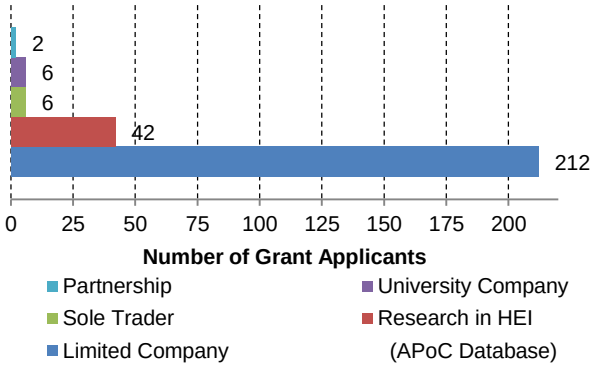
Figure 12 - Number of Active Grant Holders x Number of Employees



(APoC Database)

Paradoxically, despite the number of micro enterprises and self- employed persons, the database records the legal form of applicants as being predominantly limited liability companies (Figure 13).

Figure 13 - Legal Form of Grant Applicants



(APoC Database)

APoC emphasised commercialisation and this meant that the majority of applicants sought ultimately, to develop the resources and expertise needed to successfully launch their product or service in a specified target market. The alternative, particularly appealing to applicants approaching APoC through Technology Transfer staff in universities, would be selling expertise and technology, perhaps through licencing or sale of IPR to an enterprise already in a position to pursue production, launch, and marketing. Both options qualified for APoC support and certainly, the flexibility of the scheme made it possible to switch between strategies where necessary.

4.5 - Outcomes: According to Conventional Evaluation.

The conventional evaluation conducted by the Managing Agent was based upon data gathered during the operation of the scheme and self-reported data provided by grant holders in post-completion questionnaires. Table 7 summarises the data available. The KPIs were revised from the original project targets following the announcement of the scheme's early closure and the resultant reduction in resources available.

Conventional evaluation indicates that operational performance was satisfactory, with enquiries generated and the processing of outline applications exceeding target by about 25%. Conversion of initial applications to full submission indicates that a larger number of enterprises than expected were unable to meet eligibility criteria, with about 9% of initial applications rejected at this stage. Nonetheless, the target for the number of grant awards made was exceeded by about 8%. A slightly higher percentage of awards were not taken up and the target for active awards was

Table 7 – Performance Data

KPI	Target	Achievement	Alternative
Enquiries	717	896	907
Outline Applications	359	480	459
Full Applications	274	283	276
Panel Presentations (34 meetings)	274	276	268
Awards Offered	221	240	240
Awards Accepted	207	220	219
Funding Utilised	£5.796m	£5.294m	
Enterprises Assisted	182	191	
Knowledge-based Collaborations	31	41	
New Patents Registered	21	128	
Jobs Created*	37.5	85.38	
Jobs Safeguarded*	136.5	202.85	
New Businesses Created	13	42	
Business Plans Written	45	51	
New Products Launched	23	51	53
Referrals to External Sources of Finance	90	91	
Investment Attracted	£4.500m	£8.091m	

(Target and Achievement figures are drawn from the Advantage Proof of Concept Fund: Final Report 2010/11. Alternative figures are derived by the researcher from the APoC database – not all data can be triangulated.
*= Jobs created and safeguarded were reported as cumulative data and were divided artificially. Figures stated are full-time equivalent personnel.)

exceeded by approximately 6%. It appears that applicants did not apply for the full amount of grant available, since total funding drawn down was 91% of anticipated

and the average grant used was about £24000 per project, with an average applicant contribution of about 36%.

As the Final Report indicates, the assumption was that APoC led to successful outcomes and this is supported by measurements indicating that targets for jobs created and safeguarded were exceeded by over 227% and 148% respectively. Similarly, the number of reported patent registrations was over six times higher than target and over twice the target number of new products were reported as being launched. Unfortunately, based upon the data available, it is not possible to attribute any form of causality to APoC, nor is it possible to provide any explanation of why the scheme may have led to these outputs.

The final report concluded with a number of observations:

- Demand was high and the quality of applications was perceived to increase as the project progressed, indicating the scheme could have remained in operation.
- About 25% of projects eventually resulted in successful product launches, but follow-up funding was required in many instances.
- The use of sub-regional nodes resulted in a successful, rapid launch of the scheme and even regional coverage.
- Centralised procedures with devolved implementation resulted in equitable treatment of all enterprises, irrespective of their initial point of contact.
- The ‘stage-gate’ progression system ensured that at least three independent assessments were made as a project proceeded from initial enquiry to final award.

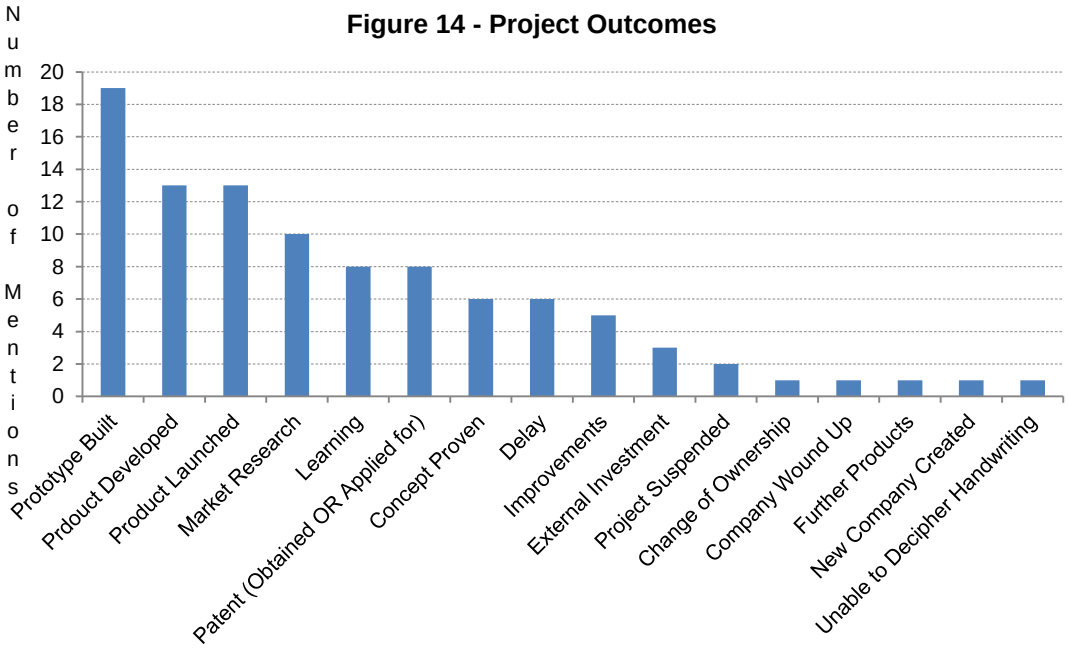
4.6 - Outcomes: Qualitative Analysis of Supplementary Questions

The final round of follow-up feedback questionnaires was sent out by the Managing Agent in early 2012. As indicated in sub-section 3.4.1 the researcher was able to

insert three questions to gather qualitative responses concerning the outcomes perceived to have arisen due to the availability of APoC grants. Additionally, a small number of questions already included elicited qualitative responses (comments) inserted freehand by the respondent in the questionnaire. Analysis expands the conventional evaluation outcomes reported in sub-section 4.5 – Outcomes: According to Conventional Evaluation. The following comments address qualitative analysis of responses in the sequence asked (Appendix 1 – APoC Second Feedback Questionnaire).

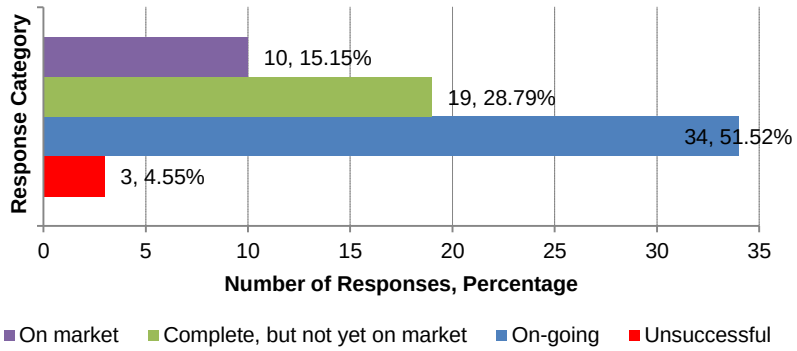
Question 1a asked respondents to provide a short description of the outcome of the project supported by their APoC grant. Figure 14 summarises the identified outcomes. The strong emphasis on product or service probably reflects the applicants' interest in technological development, whilst mention of market research may be indicative of the drive towards commercialisation, a basic tenet of APoC. Interestingly, learning featured strongly, although there is no indication of conventional evaluation identifying this as an outcome.

Figure 14 - Project Outcomes



(Based on 59 responses (27.19% response rate); multiple mentions permitted.)

Figure 15 - Project Progression



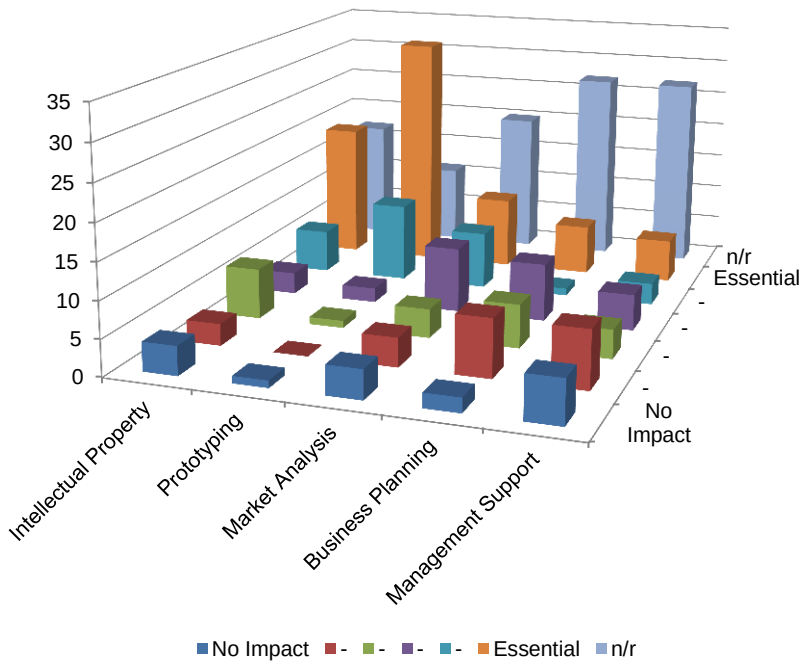
(Based on 59 responses (27.19% response rate); multiple responses permitted.)

Next, respondents were asked, question 2a, to indicate the then current position of their project. Figure 15 infers that gathering feedback was taking place before the majority of projects (approximately 80%) had reached maturity. Some respondents believed they had completed the technological aspects, but had not yet succeeded in establishing a market presence. However, the extent of further activity required to complete about half the funded projects is not known.

Question 5a asked respondents to indicate, using a six-point categorical scale, the perceived importance of the five qualifying activities in bringing the project to its then current position. Figure 16 is a pictorial presentation of data displayed in Table 8 which, shows that respondents perceived prototyping and support for intellectual property to be the most valued qualifying activities. This chimes with respondents' views of project outcomes shown in Figure 14 and may be explained by the dominance of technology and/or research-based applicants, with comparatively low levels of appreciation of the importance of commercial skills and the comparatively early positioning of the need for proof of concept in the archetypal linear process of innovation. Knockaert *et al.'s* findings (2013, p.94-95) indicated that new technology-based firms seeking to launch new products/service have a high need for marketing-related support services. This need did not appear to have been recognised by

APoC grant holders, probably due to the perceived need to prioritise proof of concept above marketing activity.

Figure 16 - Perceived Value of Qualifying Activities



(Based on 59 responses (27.19% response rate); multiple responses permitted.)

Whilst respondents perceiving high importance are likely to be motivated to report their rating, ratings of activities perceived to be of low importance are uncertain. It is not clear how respondents interpreted the difference between giving an activity no rating and explicitly stating that the activity had no impact. Over 81% of respondents gave a rating for prototyping activity, but less than 55% expressed their opinion of management support.

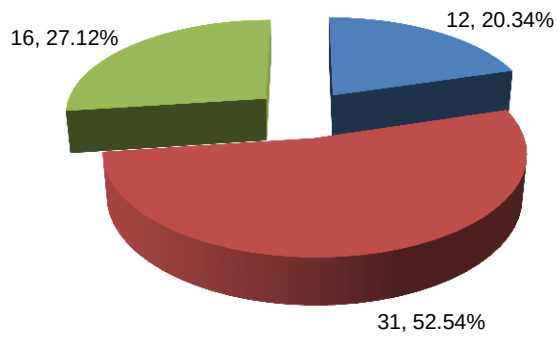
Table 8 – Respondent Ratings of Perceived Value of Qualifying Activities

	No Impact	-	-	-	-	Essential	No Rating
Intellectual Property	4	3	7	3	6	19	17
Prototyping	1	0	1	2	11	33	11
Market Analysis	4	4	4	9	8	10	20
Business Planning	2	8	6	8	1	7	27
Management Support	6	8	4	5	3	6	27

(Based on 59 responses (27.19% response rate); multiple responses permitted.)

Given that APoC was no longer accepting applications approaching final closure, respondents were asked whether they were engaged in seeking funding. Surprisingly, Figure 17 shows that over half the respondents were not seeking additional finance. Since over half the respondents had indicated that their projects were not yet complete – Figure 15 – it might have been expected that further funding would be sought. Alternative explanations could have included sufficient funding being available, with technical or marketing difficulties delaying completion.

Figure 17 - Further Funding



(Based on 28 responses from 59 enterprises.)

Question 10 focused explicitly on any public or university-based support services utilised by respondents, post-APoC. Unfortunately, only sixteen respondents indicated that additional services had been accessed. These included specialised consultancy services (mainly IPR), marketing, and management development, all of which could have been accessed with support from APoC. Additional finance from alternative funding schemes was also obtained, but, unfortunately, the data available is too coarse to identify whether respondents indicating that they had obtained additional finance were drawn from the group who had indicated – Figure 17 – Further Funding that they were seeking further funding.

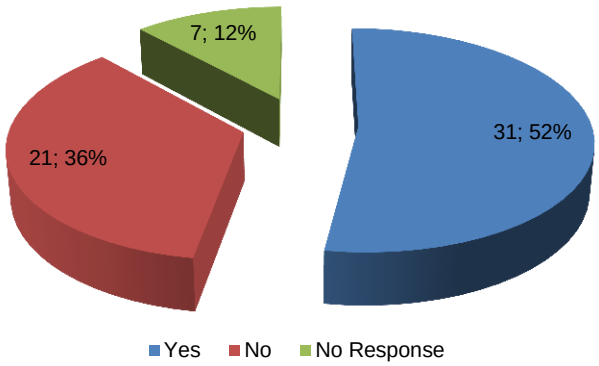
Questions 11, 12, and 13 gathered further details of the types of jobs created and safeguarded, and the types of employees affected. Respondents indicated that sixty-nine new jobs were created, but the full time equivalent status of these positions is unknown. Fifty new jobs were occupied by male, and nineteen by female, employees. Collectively, the new employees worked a total of 2484 hours per week, an average of about 36 hrs per person. This infers that the jobs created were primarily full time. The data given appears to describe about 80% of job creation, as reported in the APoC Fund: Final Report 2010/11.

The data covering jobs safeguarded is less expansive, covering about 43% of the figure given in the same report. Eighty-seven jobs, or eighty-two point three full time equivalents, were safeguarded, affecting sixty-nine male and eighteen female employees. Similarly, the average hours worked per week was about thirty six, suggesting that these were also primarily full time posts equivalent to 3137.5 working hours per week. The expanded data infers that there was little opportunity to reduce hours in the face of depressed trading conditions and jobs depended upon the success of APoC projects.

Additionally, question 12 asked respondents to express their opinion of how APoC safeguarded the jobs mentioned in their responses. Their freehand comments included: the scheme provided an essential resource, especially in the form of cash-flow; it facilitated new product development leading to sales, leading to jobs and financial security; improved product knowledge was generated along with market contacts; the scheme encouraged a drive towards achieving objectives; it enhanced quality leading to enhanced reputation and credibility; the scheme ensured survival, leading to being taken over; it provided security built upon a patent (or IPR); and opportunities to raise new investment.

Respondents were asked to reflect upon their expectations when engaging with APoC and question fourteen asked whether there were any unintended or unforeseen outcomes. Interestingly, two of the unforeseen outcomes identified respondents were not anticipated when the scheme was being designed and key performance indicators developed. These were new network relationships, in both the vertical and horizontal planes, and new learning that resulted in newly developed skills and knowledge. Networking also built enhanced credibility and reputation that provided opportunities to develop new relationships with customers, as well as opportunities to engage in collaborative research. New skills facilitated achieving technological leadership, which undoubtedly also enhanced networking. Surprisingly, given that this appeared to be fundamental to APoC, it is difficult to explain why some respondents cited new product opportunities as an unintended outcome, but an opportunity may have arisen from an initial unsuccessful product that triggers ideas for an alternative or further developed product that was successful.

Figure 18 - Revised Strategic Aims and Objectives



(Based on 59 responses (27.19% response rate))

Taking more of a future orientation, question 17 asked respondents whether their strategic aims or objectives had been revised since applying for an APoC grant. Figure 18 indicates that over half the respondents had done so. Examples of the revised strategic aims and objectives cited by respondents included: expanding the product range and /or service to clients; targeting new markets or refining the target market; adopting a global rather than local orientation; starting a business instead of

licencing technology; re-locating the enterprise; boosting effectiveness and efficiency; and engaging in a joint venture or finding new strategic partners. The rationale for developing revised strategic aims or objectives included: the availability of new market information; customer or prospective customer feedback; the state of the UK economy; the need for further technical development; new (technical?) knowledge being developed; and the size of enterprise being too small to pursue the original intentions.

Overall, APoC enabled grant holders to access all four of the principal innovation support service categories advocated by Heydebreck *et al.* (2000), in ways that were sufficiently adaptable to context to meet Knockaert *et al.'s* (2013) recommendations. For example, the grant itself was a small contribution to finance and partially compensated for the relative absence of opportunities to fund innovation through internal sources. However, post-APoC, the new Government still identified difficulties in accessing finance and other support interventions as obstacles to innovation in the UK: *"In the IRS* [Innovation and Research Strategy for Growth] *we identified the need for Government to continue to help innovative businesses to access finance and other forms of support, and we highlighted the importance of increasing levels of innovation in economically important sectors …"* (Willets, 2012, p.3).

Conventional evaluation, drawing upon both quantitative and qualitative data suggests that APoC, in the form that it operated, be regarded as a successful intervention. However, it is not possible to attribute causality to the outcomes identified. Additionally, there are indications that conventional evaluation did not identify all outcomes that arose for enterprises during their APoC experience. Certainly, it was unable to explain why, where or how the scheme may have been influential in creating the outcomes identified, which justifies revisiting evaluation in the light of critical realist metatheory.

5.0 - Findings

Section five reports the findings arising from the application of Danermark *et al.'s* (2002, p.109-111) explanatory research framework to explain and understand the events and processes that constituted APoC. For clarity the analysis follows the six sub-sections in their linear, sequential form. This conveys the impression that the researcher worked in a simple, sequential manner, but this is not an accurate description. Noting Danermark *et al.'s* comments concerning the model being a guiding framework, rather than a precise template the researcher moved from section to section, often reversing direction and following epicycles of reiteration in response to emergent issues.

The principal section headings reflect the stage descriptors used by Danermark *et al.* (2002, p.109-111). The raw data for analysis is drawn from the four principal data sources described in sub-section 3.4.1 - Data Gathering-

1. Interviews with Scheme Management;
2. The outcomes of a conventional evaluation conducted by the Scheme Manager;
3. Responses (self-reported data) to questionnaires issued to grant recipients;
4. Interviews with grant applicants, both successful and unsuccessful.

The analysis progressed from the tangible aspects of APoC to abstract conceptualisation, before returning to tangible reconfigurations at the close. For example, the formal procedures within APoC had a tangible form and required applicants to produce a structured application in a standardised form, following an approved template. This provided information to the Business Development Advisor (BDA), who was responsible for developing a presentation to support the application to the decision-making panel. The template and presentation conceptualised the role of proof of concept activity in a theoretical abstraction of the commercialisation process. Applicants with limited business and commercial experience improved their

understanding of business, rather than relying solely upon a technological perspective. When successful the grant enabled the newly learnt conceptual commercialisation process to be implemented in creating a tangible reality.

Briefly reprising the essential elements of Danermark *et al.'s* framework: firstly, stage one comprises a description of the situation or activity under investigation. This draws upon both quantitative and qualitative data and includes interpretations and perceptions of actors engaged in the scenario. In this research this stage focuses upon the concrete features and aspects of the APoC scheme. In social science it is common to use the term 'concrete experience' to define active participation in real circumstances. Concrete experience is perceived as constituting the actual event, rather than an abstraction; the 'real' entity. Given the size of APoC it is necessary to select only those components that appear significant in influencing outcomes. It is accepted that reductionism may lead to distortion, but manageability has to take precedence. Stage two commences by fragmenting the scheme into component aspects and dimensions for separate examination. Stage three concentrates on the underlying structures and interrelations necessary for the scheme to function. Abduction interprets the constituent elements in terms of conceptual frameworks and theoretical constructs. Stage four is closely related to stage three, but employs retroduction to explain possible causal mechanisms, both influencing and being influenced by each of the key critical components identified earlier. Stage five elaborates further and compares the relative plausibility in terms of both necessary conditions and outcomes arising from the causal mechanisms, structures and relationships thought to explain APoC. Finally, the sixth stage describes how the mechanisms, structures, and relationships manifest themselves in specific circumstances. The emphasis is to differentiate true structural conditions, which, by definition, are relatively enduring, from isolated random occurrences. The data analysed is perceived as evidence of visible outcomes arising from the specific

activities, events, and processes that comprise APoC and hence, constitutes the major source material for interpretation. Selected verbatim quotes from interview transcripts are presented as footnotes in support of this analysis. Full details of the coding strategy adopted were given in sub-section 3.4.2.1, whilst the structure of the coding nodes that emerged is shown in appendix 5 – Equivalence in Code Application. The footnotes given as evidence are selected as exemplars to illustrate the point being made, with the researcher selecting the most appropriate for the purpose. There was often no particular criterion applied in selecting exemplars, which were chosen by personal preference. This illustrated the significant role played by the researcher when adopting a critical realist perspective, since no two researchers analysing the same source material are likely to reach identical conclusions.

APoC does not exist in isolation, but was a constituent of economic and social policy. It was a component of local society conceived, developed, and implemented within the broader context of the fabric of society. Hence, data is interpreted in the light of knowledge and experience of the broader context in which both APoC and applicants operated. Whilst the principal focus of analysis is APoC, its objects, properties, structures, mechanisms, and outcomes, the impact of the broader context cannot be ignored.

5.1 – Stage One - Description

Stage one provides a description of the scheme based on the experiences of Scheme Management and Enterprise interviews, distilled from their recorded comments. It supplements and expands the descriptive details given in Section 1.0 – Introduction and Section 4.0 – APoC Scheme. Applying an open coding approach (sub-section 3.4.2.1 - Coding) led to the identification of 1501 coded references from Scheme Management and 3300 from Enterprise interviewees. A small number were

ignored because, after further consideration, the point emerging did not appear directly relevant. Consequently, 1486 Scheme Management (appendix 6 – Node x Scheme Management Table) and 2616 Enterprise (appendix 7 – Node x Enterprise Table) coded references were brought forward for further examination[28]. For brevity only those features considered influential are reported here and this description should not be regarded as comprehensive. The researcher has selected a very small number of verbatim quotations as footnotes for illustration. It is accepted that reductionism may lead to distortion, but manageability has to take precedence. The core purpose of this sub-section is to provide a foundation for the argument developed through the remainder of Section Five – Findings, bearing in mind that the key activities in data interpretation are abduction (sub-section 5.3 – Stage Three – Abduction / Theoretical Redescription) and retroduction (sub-section 5.4 – Stage Four - Retroduction).

5.1.1 - Development of the Scheme

The following description of the development of the scheme draws principally, but not exclusively, upon Scheme Management interviews[29]. The scheme was conceived as an example of a mechanism needed to deliver an *"…exogenous shock or disruption* [that] *is required for a departure from a position of path dependency…"* (Parker and Hine, 2013, p.7) intended to change behaviour and stimulate innovative activity in the West Midlands. Arguably, interviewees were already open to disrupting path dependent behaviour by participating in, or supporting, innovation.

[28] Copies of all coded references in the form of verbatim quotations are available in electronic form on request.
[29] No grant applicants were directly involved in the design and development of the scheme.

The West Midlands had an established innovation culture[30] but was performing relatively poorly vis-à-vis comparable regions in the UK[31]. The then current regional enterprise strategy was perceived as lacking a focus on innovation because it did not explicitly address proof of concept activity.[32]

APoC benefitted from the Government's policy of devolving responsibility to local regional representatives who devised and developed schemes targeting local needs within the declared intention of fostering and supporting innovation for economic advantage[33]. Several individuals inferred that they were personally responsible for identifying the need for a proof of concept fund in the region[34]. None of these claims could be corroborated independently, suggesting that there were a number of like-minded individuals already working towards a similar goal. However, it was not until the Regional Development Agency (Advantage West Midlands - AWM) took up the idea that any substance emerged[35].

The decision to provide grant funding was not a deliberate statement to highlight specific local difficulties or market failure, although it was recognised that enterprises found difficulty in attracting external investment until commercial potential had been demonstrated[36]. Finance remained the most flexible resource, readily moulded to

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[30] *"Surveys had shown that innovation was far from absent in this region." (SM06).*
[31] *"…parts of the West Midlands region, good parts of it, are some of the lowest …in the country for gross value added… "(SM10).*
[32] *"…there was an overarching desire to change the focus of the regional enterprise strategy to actually address GVA specifically, and one of the ways of doing that, obviously, is to actually generate faster growth of high growth-high value companies and one of the catalysts for doing that is actually getting proof of concept stage dealt with." (SM02).*
[33] www.official-documents.gov.uk/document/cm82/8239/8239.pdf - accessed 3rd July 2013
[34] *"I think my primary role was instigating the whole idea…" (SM06).*
[35] *"I think it would be AWM, I guess, who originated the idea, but I think it's probably one of those ideas that comes out of the ether and the network of the time." (SM12).*
[36] *"…a number of reports were commissioned to look at where these equity…where these investment gaps lay. Some of them are around supporting business angels to invest via matched funds; others were around the earlier stage, which is where we came in. There was clearly a difficulty for private sector investors to invest in early stage technology businesses when those businesses had not got sufficient evidence to support the investment, and that evidence tended to be in proof of principle in terms of technology, markets validation, appropriate patent protection, understanding commercial*

suit precise requirements and, hence, a grant scheme was designed to contribute towards solving this difficulty.

There was a clear dichotomy between applicants who believed proof of concept referred only to technological (or scientific) outcomes[37] and those who recognised that commercial viability is equally important[38]. The initial concept for APoC was clearly intended to embrace both. The grant focused on five generic elements of proof of concept activity: prototype development; intellectual property; business planning; market assessment; and management development[39].

Certain sectors were prioritised because they offered opportunities to achieve sustainable growth. Resources were limited and, partly to ensure that only fully committed applicants were attracted, a maximum grant value of 75% of estimated project cost, or £30,000, was established[40]. It was an essential pre-requisite that an applicant demonstrated they were able to provide funding for at least 25% of the estimated project cost, although it was always likely that a project would cost considerably more than the estimate and on-going funding would be required.

Since AWM had neither the capacity nor the experience to manage the scheme, a managing agent was appointed[41]. AWM, with assistance from selected local support

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expectations in the market place. And, all of those things, to do them properly, to do them in a relatively independent fashion, cost money, and that's where this particular initiative was targeted." (SM01).

[37] "…demonstrating that a product idea is viable from a technical performance point of view…" (E26).

[38] "Proof of concept to us meant being able to build a working prototype, test it and prove that the idea was technically feasible. At the same time to look at the commercial aspects and determine if it was commercially feasible, as well." (E07).

[39] "Those five things were discussed by the Regional Finance Forum and agreed from feedback from those as being the biggest barriers to commercialising new technologies." (SM01).

[40] "…it was pitched that the grant would meet 75% of the external costs, so there was no paying for own time or anything like that as part of this, but, 75% was a relatively generous amount." (SM04).

[41] "They didn't feel they had the skills to do it and they're right. They weren't set up to manage projects like that, they didn't have the right type of staff, they didn't have the right understanding. And yet in the region and beyond, because they had bidders from outside the region, there are a number of organisations who have the credibility, experience to do something like this well. So it was appropriate for them to tender it." (SM06).

providers, developed an initial concept which was put out to tender. The tender document outlined the broad specification, but tenderers were free to design their preferred *modus operandi*, establish a level of management fees, and forecast their anticipated performance vis-à-vis the targets and key performance indicators in the tender specification[42]. After due process the Managing Agent was appointed, budgets, operating, reporting procedures and a launch date were agreed[43].

The expected outcomes were stated in the agreement as key performance indicators. Job creation, safeguarding existing employment, and wealth creation, with implicit wealth distribution, were the most prominent expectations.[44] There were also expectations that funding provided by the scheme would facilitate access to further sources of funds, ensuring sustainability for the applicant enterprise[45].

5.1.2 - Operational Procedures

The successful bid from the Managing Agent met the expectations established by AWM, as set out in the tender document,[46] and interpreted the scheme as being much more than simply a provider of funds, seeking to include business and

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[42] *"… an awful lot of [the] objectives were drawn from that original AWM OJEU (Advantage West Midlands Official Journal of the European Union) tender notice, because they were very, very explicit in what they were trying to do. And, because it was a very well realised message, it was quite easy for [tenderers] to get on-board and use it as [their] banner." (SM01).*

[43] *"…the tenders went in in January/February of 2008, with the intention that the fund would be up and running in June of 2008, and it was going to be a 22 month programme…" (SM02).*

[44] *"It was then seen, as is now, that the way out of the recession is to assist some of these very early stage ideas, try and grow the business, provide employment, provide wealth for…for the region." (SM08).*

[45] *"The core function would be to provide seed-funding for firms that would create a platform for further investment." (SM05).*

[46] *"…[name of managing agent] came out top it terms of the marking criteria:…well, price was an element of it; the extent to which they thought they would be able to get penetration of the market was a factor; the knowledge of the background of this type of activity; previous experience of running ERDF funded projects, because it is an ERDF funded project. So, all those sorts of things contributed to them winning the tender. … the way that the [name of managing agent] pitched it, they had done a lot of networking. It was apparent that there was a lot networking going to take place which was very important in getting early penetration of what was going on. So that was one of the reasons why" (SM04).*

technical support advice where appropriate[47]. There was a need to justify the use of public resources for the direct benefit of such a tiny number of citizens, and to evaluate the outcomes arising from the intervention[48]. An additional complication was the use of funds from the European Regional Development Fund (ERDF), which has its own criteria and requirements[49]. In general, the arrangements put in place by the Managing Agent were supported by Scheme Management[50].

Marketing was coordinated centrally, by the Managing Agent, but was also conducted locally by each of the partners[51]. Informally, partners promoted the scheme during its final development, before contracts had actually been agreed and signed between AWM and the Managing Agent. Previous schemes had virtually come to an end and there was a build-up of latent demand. Delays in completing the contracts stage meant that the scheme was launched several months later than expected and this added to the early build-up[52]. Applicants indicated that they had heard about APoC from a wide variety of sources, suggesting that marketing was comprehensive[53]. However, one applicant indicated that not all of the publicity concerning APoC gave a positive impression, although this did not prevent them from

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[47] *"We considered that the support that was given to them was as beneficial, if not more beneficial, than the actual money they got." (SM10).*
[48] *"You are taking a risk - grow a business that will then benefit the public work space, pay tax and employment… …that's the bet that government is taking. If the Government is risk averse and shouldn't be making those kind of bets that's fine…" (E24).*
[49] *"…one of the problems with the ERDF are the terms and conditions that go alongside it." (SM14).*
[50] *"For the clients benefit, for AWM's benefit, for the taxpayers' benefit, whatever, and you have to be pedantic with a client to make sure that they keep on giving you the information you want, because sometimes it's so very hard to get that information out of them. You know, 'cos it's not important to them, but it is to a scheme like this." (SM15).*
[51] *"In general there was a lot of publicity down at the front end by the fund itself. So it came out centrally, the build-up was there before it was actually formally launched." (SM08).*
[52] *"It was obvious that there was a massive need out there for this sort of funding ... because, right from the very beginning we seemed to have the required amount of ... of ideas at each panel, and we even had to put additional panels on as well." (SM15).*
[53] *"I learnt from two different sources. One from a network contact who worked for Business Link who was directly involved in the project, and I also went to an open-day come seminar where several grants funding opportunities were being promoted and proof of concept was one of those that came up." (E03).*

pursuing their interest[54]. Scheme Management interpreted marketing as being successful[55].

APoC succeeded in attracting a range of different applicants[56]. Not all applicants purposefully pursued the opportunity to create new businesses or enterprises[57]. Reasons cited for applying for the grant included:-

a) To supplement other activities being undertaken within the enterprise[58];
b) To obtain IP without consideration of end-product potential[59];
c) The desire, thrill, and excitement of seeking to develop world-leading products or services[60];
d) To champion new technology[61];
e) To enjoy the process of solving a problem[62];
f) The need to prove technology, testing and achieving required accreditation standards[63].

The application procedure ensured that enquirers who did not qualify were informed immediately; that applicants who either did not satisfy the due diligence criteria or were unable to prepare a satisfactory application were rejected as early as possible; and that applications going through to panel were most likely to be awarded a

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[54] *"…it was a little article saying that not many people have actually taken up the grant or applied for it and then we sort of went from there." (E17).*
[55] *"I can only assume it was fine, because there was this backlog of people wanting to submit applications." (SM09).*
[56] *"They were very varied, but have to say I did identify personally there were a lot under the medical technology side: mainly because they blew my mind and it was very difficult for me to understand and grasp exactly what they were trying to do. But we had lots … we … it was very, very varied. Towards the end, it was very varied." (SM15).*
[57] *"I never intended it to be a business in its own right, it's a, it's an item that I wish to sell because I need one for the business of consultancy." (E01).*
[58] *"…it's actually spurred us on and we've actually now developed another process that we've gone on paper…" (E10).*
[59] *"…and file new IP without thinking how to structure the business around that IP…" (E05).*
[60] *"I want it to grow and be the best there is in the world I want us to be a world-class company." (E32).*
[61] *"I applied for the grant….purely on the basis to help me shall we say further my technology…" (E20).*
[62] *"…help me with delivering the hardware side of the agreement with our clients as well as delivering the software side which is server-based…" (E25).*
[63] *"…to pay for testing by the British research establishment of the material…" (E20).*

grant[64]. This ensured that minimum time and resource were expended, both by Scheme Management and by inappropriate or unsatisfactory applicants[65]. It was perceived as *"…straightforward…"*[66]; *"…rigorous…"*[67]; and "…*quick…"*[68] and it was hoped that the application procedure would be helpful even for unsuccessful applicants, in clarifying thinking and providing learning concerning grants and funding applications. However, this did not always prove to be the case, especially for more experienced applicants[69]. Other criticisms focused upon complexity[70]; missed opportunities[71]; containing too many stages[72]; and reflecting administration rather than business[73].

Business Development Advisers (BDAs) guided enquirers through the application process, providing feedback as necessary[74] and ultimately made a presentation, on behalf of the applicant, to the decision-making panel. Officially the BDA did not make contact with applicants after the award decision, but in practice, because many of the BDAs had other roles within local support providers, some contact was maintained[75].

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[64] *"…if an application was likely to be turned down as not meeting one of the criteria, it should be done at the initial stage to avoid the applicant going through the more lengthy detailed application only to fall foul of something that would have been apparent in the initial application." (SM07).*
[65] *"It was incredibly quick turnaround, from the first telephone call to being able to get financial assistance." (E01).*
[66] *"The application process wasn't too onerous and it was quite straightforward" (E12).*
[67] *"…we put our application into APoC and I was impressed, I was very impressed by the rigour with which they reviewed the application." (E19).*
[68] *"…its strength has been definitely easy application, and quick application, so the whole process was very quick, I didn't have to jump through so many hoops." (E29).*
[69] *"If it had been a founding grant for the business, the process of applying and not getting the grant would still have been extremely useful. For us as a business that was already somewhat established and trying to develop a new stream, the application process itself, while very good, and I respect it greatly, I don't think we benefitted from the process of applying and not winning." (E05).*
[70] *"…it was too complicated, too detailed…" (E11).*
[71] *"…there was a missing feedback mechanism, perhaps, or a face-to-face and experience in a fairly soft, perhaps, pitch, where they might have to make much harder pitches in the future." (E13).*
[72] *"…we did have to jump through quite a lot of loops at the time…" (E15).*
[73] *"I don't think there's a lot of paperwork in, I think there's a lot of irrelevant paperwork in. […] I think you can see it has been drawn up by bureaucrats and by government employees, you know, public employees, not people in industry." (E31).*
[74] *"We went through the initial enquiry and spoke with an advisor. They wanted to know what it was that we were about, and they gave us a feel for whether or not they think it's one that we might be able to run with. […] really good questions and I have to say his review was more insightful and far more to the point than pretty much any other review of a business proposition that I have ever been involved with." (E19).*
[75] *"…you're not just going to go and talk to that person just about Proof of Concept Fund, you'd do all of the other things that you can offer as well, all of your other services. So it makes you wonder whether or*

In some respects the BDA had a very difficult, but crucial, role and needed to balance providing a service to the enterprise / applicant with maintaining a 'control' function for APoC[76]. There was a clear tendency for BDAs to tip the balance in favour applicants[77]. BDAs were not the only source of support and guidance available through the scheme and the combination of direct contact with a local BDA and remote contact with the Managing Agent appeared effective[78].

Responsibility for making grant award decisions was devolved to an award-making panel[79]. The panels were the final step in the application process, which meant only strong applications reached them[80]. Proposals were submitted to the panel[81] by the BDA, and the applicant was not present. They were advised of the outcome through the Managing Agent. The size of the maximum grant was considered relatively large vis-à-vis previous schemes[82]. Once awarded, the grant took the form of a facility with money drawn down against claims, evidenced by invoices for qualifying activities. This emphasised that internal expenditure would not qualify[83]. Panel members

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not the Proof of Concept was a very nice way of getting your foot in the door, to then build up that relationship." (SM09).

[76] "…there is the, sort of, ... there's a kind of question over whether my role was simply that of an advocate to champion the particular company's application or whether I was also in there as part of the ... the filtering system as well, and I ... was comfortable in taking on both aspects but I, for sure, it was never explicit where I should be sitting in that." (SM13).

[77] "…sometimes I was aware I was working on something which the researchers probably thought 'here's another way of getting a grant' (laughs). and I need to sort of fit it in such a way to try and get it through the system. I was aware of that, I wouldn't discourage that because they all ... unless I thought there is no potential in this at all, no market potential in this ... I put it forward…" (SM12).

[78] "I actually thought the support we got from APoC was really first class because there was always somebody at the other end of the telephone, [name] or whoever to talk to you, to explain to you, to give you more information and the actual process of applying wasn't as arduous as I thought it would be." (E32).

[79] "First of all, [the managing agent] ran a hub and spoke operation…[the] second way was that [the managing agent] operated these investments panels…which ran twice a month, and [the managing agent] had a North and a South Panel." (SM02).

[80] "…I think the applicants saw what the rules were and, therefore, we only had applications from those that thought they fitted and, and yes 99% of them did." (SM07).

[81] "…this is where the meeting them and talking it over and seeing what they do actually comes out, because ... because [name] does most of it, because, obviously, it's presenting to the panel on their behalf." (SM10).

[82] " the proportion of funding available was also more substantial than most of the other schemes". (E33).

[83] "…it was pitched that the grant would meet 75% of the external costs, so there was no paying for own time or anything like that as part of this […]." (SM04).

served several important functions for APoC and the Managing Agent[84], including providing reassurance that the process of grant award was independent[85]. An independent observer was asked to attend early meetings of both panels on behalf of the Managing Agent, to ensure consistency. Some differences were noted and concern expressed[86]. Applicants appreciated the difficulty of being a panel member and the time and effort devoted to decisions[87].

A number of difficulties occurred during the operation of the scheme. From the perspective of Scheme Management, these included: delays in launching the scheme due to contractual difficulties[88]; slow take-up[89]; marketing penetration[90]; inappropriate applicants[91]. From the perspective of grant applicants, these included: technical difficulties[92]; marketing[93]; internal costs[94]; absence of long-term commitment/funding[95]; location of facilities[96]; and timescales[97]. In many instances

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[84] *"…the panels had to be there to demonstrate to the sub-regional organisations and to AWM that the process was fair and transparent. In addition, while some panel members had more experience than others, the decision making process was usually well marshalled by the panel chairs. Furthermore, to read and retain the information for a dozen or so applications would have been difficult given the time involved in doing so." (SM07).*

[85] *"I think it was transparent, because of the panels; it wasn't me making the decision, or anyone from APoC making the decision, it was really the panel that was deciding what was going to happen…" (SM10).*

[86] *"A consultant contracted by [managing agent] attended some of the early panel meetings as an independent observer. His view as expressed to me was that they were largely a waste of time given that their ability to make decisions was no better than a handful of "experts" who could have decided very quickly after the application have been assessed. […] There was a difference between the North and South panels in terms of decision making as the South were more rigorous in their analysis and questioning of each application. This can be explained to a certain extent by personnel and the South seemed to have more people with a financial and equity investment background." (SM07).*

[87] *"These guys genuinely, genuinely wanted to see these businesses succeed and the scheme was geared to helping ensure that outcome." (E19).*

[88] *"…the processes from going from tender to contract can be quite convoluted and that would have been, effectively, what happened; you could say bureaucratic, probably it's that sort of delay which arises…" (SM04).*

[89] *"Some nodes were very slow in take-up and, especially for them; the twenty-two month period of operation was not enough for them to really take advantage." (SM05).*

[90] *"…even towards the tail end, I did have companies coming to me that said they'd only just found out about the scheme, and really it was too late. The doors, the doors were by that time closed…" (SM08).*

[91] *"…some of them, by going through the application process, they were realising, "Well, actually I'm not quite ready to do this", or they'd have put in a full application and gone through with everything. "Too early for me." …" (SM11).*

[92] *"…there were still a few nagging technical issues behind the technology which the scope of the AWM funds available were not sufficient to cover." (E05).*

[93] *"…that's the hardest thing is getting people to understand our product." (E06).*

[94] *"…the internal cost of people's time working on the project wasn't included so it was obviously quite a lot more if you include that." (E12).*

[95] *"…it was a short sharp intervention which was useful, but there was no long-term…" (E13).*

the difficulties experienced were outside the control of APoC and very little action could be taken to alleviate the problems experienced.

Some enterprises recognised that, although there were defined requirements, implementation was flexible[98]. It was hoped that suppliers within the region would be able to meet the needs of grant holders, although this was not an enforceable requirement[99]. The majority of claims were focused upon prototype development[100], intellectual property also featured highly[101]: both activities supported one another in working towards commercialisation[102]. There were fewer claims for business planning, market assessment or management development, but, nonetheless, these were important activities for some[103] [104].

Operationally the scheme depended heavily upon close partnerships to maintain and implement its ethos[105]. Each partner was able to make an immediate contribution to attracting applicants and providing access to support services through their existing

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[96] *"…the laboratory the area for doing it at Warwick University is too small, I've been there, I've had a look and Coventry University is far superior." (E20).*
[97] *"…the time taken has been an immensely long time…" (E24).*
[98] *"…they abided by the eligibility criteria but they were sufficiently flexible to enable us to move forward without driving a coach and horses through it and so make the whole thing a farce." (E19).*
[99] *"There were structured rules but in terms of region, no. There was no rule that said you had to take a supplier from the West Midlands. Now clearly, if at the end of the day, when it was presented to panel, you were making use of the West Midlands more, and all your suppliers were in the West Midlands, then that would be seen as favourable." (SM08).*
[100] *"People aren't interested until they have got something in their hand. So, it was a prototype; it was the first one ever. So I wouldn't have grouped in anywhere else. …it was important that we focused everything that we had on getting that tool in the press and getting a part off in our hand." (E10).*
[101] *"…we only patented it because we had the funds available to do that." (E09).*
[102] *"With the money that we had they built an aesthetic model around the functional part for us. There was some design work done as well patented design work done with [named organisation] patent attorneys…we got to the intellectual property rights…" (E18).*
[103] *"It's quite diverse, all the things that were going on. I mean, it isn't as if everybody, or fifty per cent of them, wanted prototypes making, therefore, we could say "Oh we should have a fund just for prototypes." " (SM09).*
[104] *"…significantly over half I would say, was market research…" (E28).*
[105] *"…APoC itself is a process, it's a process of engagement between the various parties in the business community and I think once you start to do that you build up process of co-operation and I think APoC is simply, you know, a bit of oil to make that work. But it's all about collaboration, co-operation and sharing risk…" (SM14).*

network[106]. Naturally, contact with applicants enabled partners, through BDAs, to introduce support service that were outside the APoC scheme, but which offered relevant high quality services to the applicant[107]. Interestingly, although some of the partners may have been able to offer competing services, APoC engendered a spirit of cooperation and collaboration in which the applicant's needs appeared to be prioritised. Additionally, the partners recognised that close collaborative activity was beneficial[108].

There appeared to be some misunderstandings concerning the role of support services and the relationship between support providers and the grant[109]. Help and support did not necessarily mean looking beyond APoC[110] although some applicants found most help outside the scheme[111]. Naturally, a relationship develops between the provider and recipient of support and where that relationship proves beneficial, perhaps mutually beneficial, it endures[112].

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[106] *"…the reason for that partnership was that these were organisations that held similar beliefs about the opportunity for innovation in the region, had extensive networks in their own spheres of influence and had done something vaguely similar before." (SM06).*

[107] *"…it probably would make an awful lot of those companies aware of what else, what other support they can get, what other mechanisms there are in place to assist them, that they're not running alone. So, you know, huge benefit." (SM08).*

[108] *"It also enabled me to build relationships, better relationships with other partners." (SM15).*

[109] *"I went to them first because that was part of the rules, you know, was to seek MAS and everything else. I never spoke to anybody there who seemed to really point me in the right direction or even comprehend what it was that I was trying to do. It was a…it was a bit of a flop really and I've heard nothing but similar things from every other person whose ever tried to use them." (E09).*

[110] *"…it was with the help of our Business Development Agent [sic] [name]. He helped us immensely by taking us to a design place, a design shop and they procured the scientific calculations, the shape and form of how it should be… (E18).*

[111] *"The biggest thing that has helped me the most is Coventry University without a shadow of a doubt. […] My machines down there now and I have a wonderful rapport with them. I've got to say Coventry University have probably been my biggest help in all of this." (E20).*

[112] *"…two years on I'm still getting support from various government quango agencies around the country, but specifically in the Midlands, to support my export activities and my development projects so it was lucrative on many levels, not just for the financial assistance." (E01).*

5.1.3 - Outcomes

Most applicants indicated that they had implemented their plan very much as expected[113]. However, their responses were gathered after the event and allowance must be made for hindsight bias.

Despite expressing generally risk-averse attitudes[114] grant holders had accepted that some risk is inevitable when engaging in innovation[115]. Risk was perceived as financial exposure, negative impact upon perceptions of self-efficacy, fear of project failure and the loss of time devoted to the project in the event of an unsuccessful outcome[116]. The grant shifted the perception of the risk in the project since an element of cost was borne by others and, hence, proceeding became more acceptable[117]. This was partly due to reducing financial exposure and partly timing of when maximum risk was likely to occur. The grant provided a reason not to delay the decision to proceed hoping for more favourable circumstances[118]. Some enterprises engaged in activities sooner than they otherwise would have and with a great sense of freedom stemming from reduced risk[119].

The relationship between risk and grant funding is complex and not necessarily specifically related to the amount of funding provided. For example, an indirect effect concerns the timing of when to take on debt finance as an alternative source[120]. The grant available from APoC was unlikely to cover all the direct costs of a given

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[113] *"I think we followed our plan as we set it out initially, we stuck to that." (E22).*
[114] *"…I do not like to risk. We are a very conservative business…" (E32).*
[115] *"…[if] anything stifles innovation and entrepreneurialism it's the personal risk that people are expected to take on." (E03).*
[116] *"…the biggest risk a person ever takes in business is the decision to quit their job and start a business. It's the kind of thing that I guess APoC can help with." (E05).*
[117] *"…basically it means that yes there is less at stake if you sell nothing so yes it definitely lowers the risk." (E23).*
[118] "…without the trigger of the APoC grant I wouldn't have kicked the project off. I would have delayed it. Not 2009 I would have said 'let's give it a couple of years, see what happens to the economy' and I would have got to 2011-2012 and gone 'shit, I'm not doing anything here'." *(E04)*.
[119] *"Whatever we would have done would have been on a smaller scale and slower…" (E33).*
[120] *"…lowering the risk of getting investors to go ahead and get ideas off the drawing board into reality…" (E23).*

project[121], however, grant funding helped take the enterprise forward during a time of uncertainty[122]. Larger grant holders and those already in business appear to have some acceptance of risk and a more sophisticated appreciation of risk-reward relationships than smaller and newer enterprises[123].

Although many of the outcomes were expressed in financial terms, there were wider issues[124] [125], including satisfaction derived from successful outcomes[126]. Applicants described a sense of elation when hearing that they had been successful[127], sometimes accompanied by a sense of having now made a commitment that had to be honoured. Other applicants simply expressed their pleasure in receiving support[128]. Applicants were pleased to receive good news because they understood the benefits it would bring for their enterprise[129]. However, for at least one applicant, the outcome of their application was no surprise because they had confidence in their success[130]. Naturally, applicants who did not receive a grant did not express positive opinions of APoC[131]. Disappointment was expressed concerning the investment of

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[121] *"…the economic conditions…a choice of be unemployed or become self-employed…this really was a catalyst to do that. I knew I couldn't afford to do it out of my own pocket, without investing a significant amount of capital in it, that I didn't have. It wasn't that I wasn't willing to risk my own capital, it's just that I didn't have enough capital and I wasn't rea…I wasn't willing to take on debt in order to do it. It wasn't the time to be taking on debt at that point. That was pretty much it, really." (E01).*

[122] "…the benefits of the grant schemes are that it gives you that - just that little bit of confidence, more confidence to go about doing it without risking everything. *[…] grants are great, they help us sleep a little bit easier at night because like I say that risk is reduced…" (E28).*

[123] *"Our attitude is different. We're willing and we have been willing to risk our own money and we've been willing to go for a long time period without any income; without any salary. We've lived off our savings. A lot of people just aren't willing to do that. They just don't have the mind-set to risk their money." (E22).*

[124] *"…not only getting the APoC grant but the connections into the support services…" (E01).*

[125] *"…the people that we have taken on directly as a result of this activity it exceeds 10." (E27).*

[126] *"…seeing businesses diversify to safeguard jobs was very rewarding." (SM15).*

[127] *"I was very pleased; I do remember getting the e-mail. I couldn't quite believe it when I read it, so, you know, fist in the air; well done, but it did also bring a whole host of…what do you call it, crystallisation worries that 'Oh shit! I might have to do this now'." (E04).*

[128] *"One of the highlights of my life really; I know it probably sounds a bit sad to some people." (E10).*

[129] *"…absolutely elated. We were really pleased because it meant we could go go go go go…" (E32).*

[130] *"I knew I was going to get it." (E31).*

[131] *"I think we were a little bit disappointed because I think we thought we matched the brief very well…" (E08).*

time and resource that had been made in completing the application process, only for funding to be denied[132].

Many enterprises recognised that without APoC they would have been unable to convert their ideas into tangible products or services[133]. APoC was seen as the difference between remaining an idea and becoming a physical reality[134]. Sometimes enterprises perceived acceptance of the grant as imposing an obligation to act with a high(er) degree of responsibility, because it was being monitored[135]. For others the grant was seen as relieving financial pressure and allowing more freedom[136]. The scheme opened up opportunities that might otherwise have remained closed[137]. Sometimes improved opportunities were manifested in enhancing the quality both working conditions and the product or service being produced[138], or provided access to collaborative projects[139].

The scheme also provided intangible benefits that assisted grant holders[140]. APoC clearly boosted morale and confidence to start and complete the project[141], because

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[132] *"I don't normally go for these things unless I think I've got a good chance of doing it because of the time it takes. They are burdensome sometimes in terms of the time. I think it's probably the only one I haven't succeeded on in the last ten or fifteen years. Again, because I don't normally follow through unless I think I have got a good chance. So, I was a little bit disappointed…" (E03).*

[133] *"It was too far beyond our existing knowledge to be able to do it without the APoC funding. In the case of the second project we would have done less and more slowly." (E33).*

[134] *"The money made the difference between it becoming a project that was realistic, that could get to market and it only ever being my pipe dream." (E01).*

[135] *"…they put on the project a clear understanding that it was going to be monitored and that therefore, you know, we knew that we had to do our bit." (E27).*

[136] *"…without the grant I think we'd have either…like I say…not done it or not done it yet or maybe something else would have taken over and we'd have never done it or we'd have done it slower." (E15).*

[137] *"APoC has opened our eyes to opportunities in the [descriptor] market which we weren't aware of previously." (E22)*

[138] *"…this is actually being done properly whereas everything before that was me just sort of tinkering in the back garden." (E09).*

[139] *"…we are a relatively minor partner but I think probably without the APoC getting us in there if you like I think it's unlikely we would have been participants in those projects." (E33).*

[140] *"…[the projects] significantly raised our profile within a particular customer segment, allowing us to exploit opportunities for increased business with existing or new customers." (E33).*

[141] *"Did they actually do anything which significantly contributed to the running of the project - I think the answer is probably no, but the one thing that they did is…was that they put on the project a clear understanding that it was going to be monitored and that therefore, you know, we knew that we had to do our bit. This wasn't a project that we could just say it's not going so well let's put to one side and get on with this. We had to drive it through to a conclusion." (E27).*

someone perceived as more knowledgeable and experienced had indicated that the project could develop into a viable business[142]. Seeing the product in use also brought a sense of pride[143].

Making use of external consultants and sub-contractors built confidence that appropriate actions were being undertaken[144]. Additionally, confidence amongst external investors was enhanced by presenting a working 'model' of the proposed product[145]. However, confidence amongst supporting organisations was lost if there were repeated failures to meet promised deadlines[146].

APoC speeded-up the process of reaching the point where decisions were made[147], which enabled some projects to proceed to a larger scale[148], bringing together activities and sub-contract services required[149]. There were indications that without APoC this would not have been done, but it is difficult to determine precisely why, since APoC did not give additional contacts not known to participants[150]. Shortening the potential time to market also provided added value[151].

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[142] *"…it makes you a bit more confident; that is really probably the biggest boost…is that, well, people cleverer than me have said 'yeah, we can see where there is a possible business there'." (E30).*
[143] *"…to be able to walk down the street and perhaps see somebody using it and saying well I invented that I made that and have a sense of pride in myself and you know in some stupid small way sort of trying to help the West Midlands…" (E30).*
[144] *"…being able to use an external expert, being able to be more confident in the approach." (E13).*
[145] *"I have a proved concept which…you know, for me, allows me to go and say to my investors I can now prove that this works. So in terms of your risk now, it's a business risk rather than an engineering risk." (E29).*
[146] *"I said this bloody thing isn't going to happen unless we deliver the goods and I think [named organisation] we upset because they lost confidence in us we don't deliver what we said we would deliver and it didn't happen." (E19).*
[147] *"We would still have done exactly the same activities just on a different timescale so the intellectual property the patents that type of thing, we would still have done." (E26).*
[148] *"Whatever we would have done would have been on a smaller scale and slower…" (E33).*
[149] *"What APoC does, or did, was to go straight to someone who can get there quicker." (E13).*
[150] *"[network contacts] were all from our own experience. In that respect APoC and AWM didn't provide any value at all." (E19).*
[151] *"…it just would have taken us probably two years, maybe, of doing a bit here, doing a bit there…[ ]…the added value was in shortening the time to get the product to market and that is the key to it all. (E07).*

Added value for the region manifested in the form of changes in employment[152]. The commercial valuation of some enterprises receiving grants was confirmed[153], unlocking the potential for further finance from another source at a later stage[154]. Confirmation of receipt of the grant enabled some enterprises to secure funding from commercial providers, using the grant as a guarantor[155].

Not all added value took a tangible form; for example, Scheme Management suggested that enterprises appreciated the style and type of support being provided[156]. Tangible and intangible benefits arose in combination and benefited all the employees in the larger enterprises[157]. Enhancing the value of the enterprise brought reduced stress, inspiring grant holders to continue with greater belief. Added value sometimes took the form of increased opportunity awareness[158], whilst the physicality of the grant enabled enterprises to exploit opportunities they observed. Intangible benefits added value to the relationships the enterprise was building with principal stakeholders, through enhanced credibility and profile[159].

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[152] *"…creating jobs or start-ups don't increase the wealth of an area; all they do is take people off benefits and replace it by the same level. What we're…what we're advocating, what APoC did was, say, allow us the businesses to then grow, to actually their value-added growth and employ more people at a higher value and I think that what it brought to the area." (SM10).*

[153] *"It boosted the value of the company from both a financial and a security viewpoint and it boosted my peace of mind with the whole idea and encouraged me to keep going with it because I saw what it could do…" (E09).*

[154] *"I have a proved concept which…you know, for me, allows me to go and say to my investors I can now prove that this works." (E29).*

[155] *"…the beauty is you see if you've got a an offer letter, from APoC, that says you know, you know, here's this money, the banks were taking that as a ... a guarantor almost of what... their money." (SM10).*

[156] *"…they appreciated the support and the approach of the people who were managing the fund, monitoring the scheme. I think they felt it was an easy and friendly scheme to deal with, so I think that's quite an important aspect of it.…" (SM04).*

[157] *"…the fact that it gives them the opportunity, I don't think anybody likes to go into work and not be able to express themselves and do something that is creative and through this they get that opportunity, which develops them." (E28).*

[158] *"APoC has opened our eyes to opportunities in the [industry] market which we weren't aware of previously." (E22).*

[159] *"…it's enabled us to build a relationship…it [the relationship] gives us immense credibility...it [the relationship] has given us depth in terms of people's perception." (E24).*

Proof of concept was fundamental to added value, and for many enterprises was the essence of the scheme[160]. Other enterprises developed a product or service to full commercialisation[161]. Successful commercialisation also generated additional business activity[162].

Scheme managers and grant recipients defined success according to their own expectations[163]. Individual scheme managers included quality of the applicants[164], number of grants awarded[165] and the benefit brought to their specific area and to the region as a whole[166]. Some scheme managers retained an overarching perspective[167] and perceived success in proving that the scheme's design was effective[168].

For enterprises, success was defined in terms of completion of proof of concept[169], including developing research outcomes[170], developing and registering intellectual property rights[171], developing prototypes[172] and successful commercialisation of the

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[160] *"…the added value would have been if it had worked, we went into it trying to create a business, and we got halfway and got stuck…that technology is still there, the project is still there and someone could still take it and do something with it so it's not really a negative." (E14).*
[161] *"…it's brought into existence something that otherwise we wouldn't have." (E12).*
[162] *"…we have won business by virtue of having it [the product]…" (E23).*
[163] *"…it worked well, because it gave us the opportunity then to talk to the customer, to ask questions…" (SM08).*
[164] *"…we actually got the right ones through. You know we tried to minimise the risk for them, we tried to get the ones that we thought were going to bring the biggest benefit to the fund through…" (SM09).*
[165] *"…principally its success was levels of penetration that it managed to achieve, and the fact that they got strong deal flow, got a lot of money out of the door, got a lot of offers out of the door, and some of them will come through to get further funding through different routes, as well." (SM04).*
[166] *"…the fact that all of the stuff that went on was invoiced services to other companies and a lot of them in the region. Well, you're getting all of that...that, sort of, follow through in terms of turnover and….you know, it's, kind of, classic economics isn't it really? You're kind of making the money work several times over." (SM13).*
[167] *"The most successful outcomes have come from the firms which have been enabled to develop to stages further than thy might have been taken. Additionally, Business Angel funding has come to the fore. Also, APoC provided many firms with reasons to grow." (SM05).*
[168] *"I think biggest success really, forgetting the clients, forgetting the funding, is proving that you can run a regional project that way." (SM10).*
[169] *"…just to prove that the actual theory that ultrasound could enhance the [application descriptor] was true or false, that alone. The commercial aspects for me would have come at a later stage" (E14).*
[170] *"…it gave us the opportunity to do a piece of research that we wouldn't have done. A piece of research that nobody had done and it has given us a move into product directions that we would have tried to fund out of normal revenue streams, but we would be way, way behind where we are." (E27).*
[171] *"There was some design work done as well patented design work done with [named organisation] patent attorneys…we got to the intellectual property rights…" (E18).*

product or service[173]. Completing tests and obtaining satisfactory results, achieving professional accreditation, or satisfying legal obligations/requirements were seen as successful outcomes and in some instances was essential to moving forward toward commercialisation[174]. Partial completion may not have yielded the outcome expected, but APoC was still judged a success if it helped progression towards the overall outcome desired[175].

Some applicants had achieved success but still had ideas for further development and, hence, inferred that their ambitions remained unfulfilled, suggesting that they were dissatisfied with the point reached[176]. Others defined success in terms of gathering information concerning product performance[177]. Some applicants were able to modify their project during the lifetime of the grant to add additional products and services[178]. Although achieving some degree of success, in their own terms, other applicants have been disappointed in market take-up, with no products being sold despite successful development[179].

Scheme Management were, naturally, comparatively defensive[180] whereas others took a more detached view, recognising that improvements could have been forthcoming in certain areas, especially associated with administration[181].

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[172] *"…all the measurements I get and the achievements I've made through realising the prototypes have created a lot of value and proven it can be done." (E04).*
[173] *"…it has resulted in a product, so I can't imagine it being more successful than that." (E12).*
[174] *"…the successes obviously are testing materials and proving beyond that the material passes British standards and European standards." (E20).*
[175] *"…we've got…two projects that have… are still live, they're still going and they've still got good commercial potential and they're starting to realise that potential now." (E13).*
[176] *"Get big you know that is the thing." (E32).*
[177] *"…we are still grinding the results out from them even as I speak to you today, so there is still that line drawn under the finished product. We have got useful data, but we are still working with it...truthfully…" (E24).*
[178] *"…we were allowed to change to modify as the programme went on and as long as we could justify it and as long as it makes sense with the original proposal the passive safe value that we were trying to achieve they were okay, but I suspect from a programme point of view that does get abused somewhere down the line." (E26).*
[179] *"…we thought it would be taken up a lot more quickly because it's such a brilliant product but it's been very, very slow." (E17).*
[180] *"I don't think there are any failures in APoC." (SM02).*

These points probably reflect weaknesses, rather than failures, and must be balanced against the strengths that emerged. Irrespective of the cause of failure, ultimately some applicants were not supported by APoC[182]. Providing the opportunity to fail was regarded as an integral element of the scheme[183].

Failure in the market was the most common example cited by enterprises[184]. Others concerned failure to develop the technology satisfactorily[185] or failure to obtain the necessary accreditation[186]. Additionally, some difficulties might have been contributory factors in failure, but it is not possible to confirm whether these were directly responsible for performance below expectations; for example, a lack of practical/tangible assistance[187]. Some failures were attributed by enterprises to weak operation of the scheme[188], the amount of funding available and lack of continuity after the scheme was terminated were also cited[189].

APoC was a timely intervention for some enterprises, meeting a need at the time[190]. Engaging with APoC led to different forms of learning for different enterprises[191]. Learning adds value by creating knowledge and skills that can be applied to

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[181] *"…the weakness probably was that the operation…the scheme administration costs, relative to the amount of grant were probably a bit toppy; but it came out of the tendering process." (SM04).*
[182] *"I think we were a little bit disappointed because I think we thought we matched the brief very well…" (E08). "I think we were a little bit disappointed because I think we thought we matched the brief very well…" (E08).*
[183] *"If it wasn't meant to be it wasn't meant to be; we tried. It gave the person the opportunity to test the concept, and I think that was just as much as an invaluable part of APoC as the successes." (SM15).*
[184] *"Sadly even though one is…[product name] is a year and a half into its commercial life, its sadly still early days: I would have expected more sales." (E26).*
[185] *The [name] technology did not work as well as we had all hoped. It was not as robust …" (E33).*
[186] *"…it got rejected and so it stayed at that proof of concept, we couldn't then get it to that next stage which would turn it into a sellable product or a manufacturing product….So truthfully nothing came of it, unfortunately." (E14).*
[187] *"We don't want telling how to do things, we need the help to do it …" (E06).*
[188] *"…its weaknesses were around the administrative pain of the process…" (E04).*
[189] *"I think you get dumped at the end of it…I think the grants very much like you do it and that's it, it's finished, there's no follow-up at all." (E23).*
[190] *"…the APoC grant came along at just the right moment really and gave us the opportunity to investigate that and come up with a fairly comprehensive solution. We went from being a concept to a proven solution and a proven capability." (E33).*
[191] *"…it's the breadth of, I suppose, yes, the breadth of the different experiences of people that are coming to this." (SM08).*

advantage on future occasions[192]. There was no expectation of providing formal learning and provision of the grant was not linked to a requirement to take part in formal training[193]. Learning was described as taking place incrementally and being a balance between being provided with support and action learning, and adapting an established product development framework / modus operandi used successfully in the past[194]. Hence, most learning occurred informally, through direct involvement. Reflective learning also occurred, especially for scheme managers, who reported either coming to, or confirming, important realisations[195]. There was also some reflection upon the nature of government policy for supporting innovative companies[196].

Given that some scheme managers had very little practical business experience, having developed their careers mainly within the public service, learning concerning the broader business environment was also reported[197]. APoC was one example of a category of support services found all over the country[198], hence, learning concerning APoC may also apply to other examples. Specific learning included: issues of continuity[199]; the difficulties of 'picking winners' – which projects / applicants

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[192] *"…enable me to structure an argument, to structure a pitch, and go through the process of actually thinking what do these people want to know, why, how, how do you deliver that. So it gave a framework for it." (E02).*

[193] *"It wasn't a structured, formal learning exercise in any way shape or form, but that was definitely something that I became much more aware of, the business nature of the industry, rather than the technical nature of it…" (E01).*

[194] *"It's actually going through the process and learning from the process itself that actually sets it, you know, it to be real." (E02).*

[195] *"…the most important thing that I learnt is that the belief that we were sitting in this region on strong repository of innovative ideas in our small business centre is true, and that the APoC mechanism was an appropriate way to stimulate that into action." (SM06).*

[196] *"…we've lost something with the national project disappearing completely and I think that's that to the detriment that is, to the area. I think what I've learnt from it is that...that businesses will invest their own money and the tenacity of some of those businesses…" (SM10).*

[197] *"…it certainly broadened my knowledge of…of potential business starts out there, and business ideas in general. …there are a lot of businesses out there, a lot of potential out there that we really need to keep promoting…" (SM03).*

[198] *"…it's not unique to the West Midlands, so I am supposing that it's an application built around a, kind of, like a National theme that was thought to be a good way of proceeding. [...] …the process by which these sorts of projects get set up is very convoluted and slow." (SM13).*

[199] *"…the hand over from an early scheme, which has successfully provided some support to help someone capitalise upon something, is probably an area which one might want to look at rather carefully……in future to make sure that you don't get stuff that's lost." (SM04).*

to support or reject[200], and the type of support provided[201]. Scheme managers also indicated personal learning arising from interaction with other members of grant award panels[202]. Technology transfer staff reported learning concerning grant processes[203] and, in this particular instance, it was perceived as a positive impact upon future grant applications[204].

Some applicants reported learning concerning the scientific, engineering, or technical aspects of their project, including patent processes and the performance of prototypes[205]. Learning from mistakes and failures were also cited as providing a learning experience[206] especially being able to avoid repeating mistakes[207]. Learning did not, however, guarantee a successful outcome[208]. Grant holders reported skills development in terms of: adapting to client/industry needs[209]; drawing upon

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[200] *"…ideas are not what we're short of, it's the resources to develop because you don't know ….. the trouble with ideas is that you don't know which are the ones that are going to fly in the end. You just don't know; you've got to put money into lots of projects before you know which are the ones that are going to succeed…" (SM12).*

[201] *"…it's not worth the effort of setting up the….two-day, five-day assists, the impact from them, and yet they still claim credit for some successful outcome, but they won't have contributed anything significant in that sort of time." (SM13).*

[202] *"I certainly learnt a lot from the people that sat on the panel because of the experience and the different nature of their businesses. I was able to pick things up that I could then use for our local businesses…" (SM09).*

[203] *"I've learnt a lot about how you engage with the local angels networks; a bit about man-management of academics and things; a bit about University politics and how the systems can be made to work or made not to work. So, I've learnt a lot." (E02).*

[204] *"I have learnt how to go through that kind of process and I hope since, you know, we…we put in two TSB R&D grants and got both of them, we've actually learnt how to do grants in that kind of… So that must mean we've learnt quite a lot. Must mean that we learnt what the system wants; we've learnt how the system appraises it; we've learnt what to put and what not to put to get it." (E02).*

[205] *"Oh an awful lot. I have learned is that it's not easy doing what I have done. I have learned that you should listen perhaps to people that are in a position that know more about things, you see I have been saying that I need help and then when I have been offered help I didn't take it, but perhaps I have learned the most thing is that to analyse something, if you are making something you have to analyse it diligently, you know really look at it very closely and say right there is an issue there, that is not done properly and also not to accept goods until we are 100% certain they are right." (E30).*

[206] *"…we know what it's like to succeed, we also know what it is like to fail in inverted comma's, if you want to call it a failure you learn more from your failures I suppose than your successes sometimes…" (E28).*

[207] *"…the learning curve is successful you don't make the same mistakes twice hopefully." (E21).*

[208] *"…we do understand and we are getting better but really to get those superior properties consistently you have to completely stop the [problem] forming thereafter…" (E33).*

[209] *"They tend to fit in my mind into three segments […] and you get different levels of skills and different levels of…from our point of view different levels of having to deal with each sector. Some commercially hard, some rely upon you for technical advice and some others are giving you the technical advice on new products. There are different levels of knowledge within each sector and to me there is a good division between the three" (E26).*

networks[210]; forming relationships[211]; selecting consultants[212]; working within an industry[213]; the need for accuracy[214]; technical skills and life lessons[215]; and good business practices[216].

Among Scheme Management, there was a consensus that APoC had several strong features, including being well organised and well managed[217]. For some a significant strength was the opportunity for support service providers to establish relationships with enterprises that might otherwise have been missed[218]. Other strengths included the speed with which applications were considered[219]; this was supported by applicants[220]. Equally, providing a grant rather than a loan, and requiring a 25% contribution from the applicant/grant holder, were regarded as strengths[221].

The comments from grant holders were contextually specific and reflect issues that were of particular significance to the enterprise The range of issues raised included:-

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[210] "[I have] been in the packaging industry 40 years and [colleague] has been in it for about the same length of time and obviously the work I do with the trade association as well means that we are known and know pretty much everybody else in the [name] industry. It was the opportunity for an introduction to the wider [name] industry that highlighted an additional route to market…" (E16).

[211] "I'm mature and experienced enough to do a lot of stuff myself, drawing on my network, my own personal network." (E04).

[212] "…maybe not go to a so-called consultant and pay through the nose for it just getting a practical person who knows what to look for, sort of products and how to handle them and…" (E17).

[213] "Having that procedure and now that is something that we do, you know. We get a lot more quotes and we evaluate things much more critically than we probably would have done had we not had the grant." (E12).

[214] "I have learned that you have got to be more accurate…you need to be organised." (E30).

[215] "It has been quite a massive learning curve and that's…that's just, you know, a life-lesson to take from that, let alone all the, you know, the manufacturing skills." (E09).

[216] "Just by the fact that the grant made us go out and critically examine…you know…the quotes from people and…you know…they were quite strict about that as I remember. I initially thought, you know, 'Oh God, I've got to do that' but yeah, that really helped, I think. Having that procedure and now that is something that we do, you know. We get a lot more quotes and we evaluate things much more critically than we probably would have done had we not had the grant." (E12).

[217] *"…I think that APoC was a very good model for business support…the process for APoC was, for me, a much more attractive process to go through for a company than GRD. I think the process was a successful and effective process…I don't think it could have been much better than it was. You know, of all the support schemes that I've been aware of in my, sort of, seven years in this game, I think that APoC was the…the best and the most effectively delivered…" (SM13).*

[218] "…you're not just going to go and talk to that person just about Proof of Concept Fund, you'd do all of the other things that you can offer as well, all of your other services. So it makes you wonder whether or not the Proof of Concept was a very nice way of getting your foot in the door, to then build up that relationship." (SM09).

[219] "…I think it went through quite quickly." (SM09).

[220] "…it was a reasonably easy process, had quite a quick turnaround time I think, there wasn't too much time hanging round waiting to know whether you got the money." (E11).

[221] "Quite generous, with 75% intervention, a simple process to get involved with, but there were enough constraints around it to make sure that this wasn't wasted money" (SM12).

a) a structured framework bringing together project requirements and way of working to coordinate the disparate components of a project[222];

b) the need to demonstrate a major commitment to making the project reach a conclusion, even if the conclusion was not to be what was expected[223].

c) allowing an idea to be turned into a reality[224];

d) availability of funds[225], including replacing employment income whilst pursuing the project in own time[226];

e) overcoming the gap between research and commercial funding[227];

f) the ability to carry out more product/service testing to generate more data to enhance the quality of decision-making[228];

g) the speed of processing claims[229];

h) eligibility for support[230];

i) relationships with APoC staff[231];

j) knowledgeable APoC staff, acting as a sounding board for ideas[232] without being too overbearing[233].

k) strong questioning and feedback from the APoC team[234];

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[222] *"…enable me to structure an argument, to structure a pitch, and go through the process of actually thinking what do these people want to know, why, how, how do you deliver that. So it gave a framework for it." (E02).*
[223] *"…it forced you into the commitment of doing it." (E04).*
[224] *"…made the difference between it becoming a project that was realistic, that could get to market and it only ever being my pipe dream. (E01).*
[225] *"…by providing me the funds to get this whole business off the ground and grow it to this now, and further. They provide me the means of doing the development, the funds where it was required. And without the funds we could not have done it." (E31).*
[226] *"…and I was doing it entirely from money that I was earning myself working in a bar. So, I was literally doing that and everything that I was doing was going into this. (E09).*
[227] *"…it's funding a gap, it's the gap between research and so…so getting a project from a point where it's based on research money to the point where it's got…it's…it is more…it's got commercial validity…" (E11).*
[228] *"We have got useful data, but we are still working with it...truthfully…" (E24).*
[229] *"…and I think the smooth side of it was that once you did put your claim in, you know, they did process it and you got your money out virtually within a couple of weeks, which was…that was an excellent part of it." (E07).*
[230] *"…the point I'm making is that we aren't a sort of creative innovative company that makes its own products with the exception of this one, this is something that is different for us which is suppose I think is one of the reasons I suppose which is why we are pleased we got the support we did." (E16).*
[231] *"I think that was down to the people that were running it. Their strengths were in the people. If they were still there I would have been back there." (E31).*
[232] *"…the guys who we met seemed knowledgeable and seemed supportive." (E24).*
[233] *"…they wouldn't tell you what the project needed to be which was one of the real strengths of APoC…" (E23).*

l) instances of non-financial support provided by support agencies at a local level[235];

m) the ease of applying, speed of decision-making and the general smoothness of the processes[236] [237].

The strength of the scheme was the support it received from a wide range of participants; both those producing successful outcomes and those unable to do so[238].

For Scheme Management marketing was regarded as a weakness, inferring that it was possibly too coarse and did not lead directly to enquiries[239]. It was thought by one interviewee that if the grant been larger more positive outcomes could have been achieved[240]. Another queried whether the most suitable recipients had been awarded grants[241].

Some of these themes were also identified by Enterprise interviewees, although, since the scheme was being viewed from a different perspective, additional issues were also raised. Initial marketing of the scheme was again perceived as a weakness[242]. Focusing on named themes, the timescale of scheme operation, and administrative arrangements[243] were regarded as weakness[244].

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[234] *"…all of the questions that APoC asked were exactly the sorts of questions that I would have expected." (E19).*

[235] *"…all the support we have had has been fantastic. Whether it has led to a successful product or not it has helped us. It has helped our employees, whether they have left here and gone on to other things. They have certainly developed as a result of being here and the vast majority of them have stayed in the area, so it's created more equality; an opportunity for others to move into whilst those guys have moved on." (E28).*

[236] *"The successful things is how easy it was to do…" (E14).*

[237] *"…it's all been very straightforward and it's helped us undoubtedly." (E28).*

[238] *"I have to say that APoC was far and away better than SEEDA had… My overriding impression of APoC was very, very positive and that's a cynic speaking!" (E19).*

[239] *"The marketing effort needs to be slicker with more of a direct drive to generate enquiries…" (SM05).*

[240] *"The weaknesses I think is that the £30,000 ….. limit is a bit small ……. but it's still something useful, so I am not going to ….. it's a weakness." (SM12).*

[241] *"I still feel there are examples where people won support who shouldn't have and people failed to get support who should have." (SM13).*

[242] *"…it needs to be far better advertised…" (E31).*

[243] *"…their weaknesses were in the processes…[…]…this layer of people who make their money, so called consultants, who are just filling in forms because they know what's going on and what's available and what's not. Get them out of the way." (E31).*

Continuity was highlighted, which confirms an issue raised by Scheme Management[245]. The basic requirement to use the grant to recoup only external expenditure was criticised by some enterprises[246]. Interestingly, the fact that BDAs presented the business case to the award panel was perceived as a weakness, but more from the perspective of missing a good learning opportunity, especially for applicants with limited commercial experience[247]. One Enterprise interviewee was highly critical of the relationship developed with the BDA[248].

There was an expectation in some quarters that APoC should have covered all expenditure to complete commercialisation[249]. Another enterprise regarded APoC as being more closely associated with other support service providers than was actually the case[250]. The lack of assistance provided after the grant was awarded[251] was also criticised. Another grant holder interpreted this as a fundamental lack of appreciation of business needs[252]. Others were equally critical of the lack of follow-on support[253]. One comment reflected the perception that staff on the client interface did not project a sense of energy and enthusiasm[254]. One grant holder felt that the absence of on-

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[244] *"It was very short I think, time period, I think, really." (E22).*
[245] *"…the biggest failure is what happened next…" (E10).*
[246] *"…not being able to spend any of the money internally made it difficult and cut out a lot of [potential] applications." (E11).*
[247] *"…I just wonder whether there's any mileage in either the Tech Transfer Manager or perhaps more preferably the academic, in our case, which is actually doing some sort of a pitch or presentation, purely because of experience and feedback." (E13).*
[248] *"I had a few misgivings after I had received the grant as far as he was concerned, I'll say I suppose it mainly because he was out for his own gain, part this, which I resented." (E20).*
[249] *"I have to say when you've got a technology like I've got and the potential that technology I'm afraid funding in terms of government funding or grant funding is not nowhere near enough." (E20).*
[250] *"…the services that it threw in with; for example the Manufacturing Advisory Service wasn't any kind of help at all. Business link wasn't help to me… I've not seen or heard any good from Manufacturing Advisory Service. So as I say the biggest flop is just who they're …who they're throwing in with." (E09).*
[251] *"I can't remember people coming after it was applied for and granted, people coming in and looking at things or advising or helping…" (E17).*
[252] *"I think there is a fundamental lack of understanding of what businesses require…" (E21).*
[253] *"…and we felt that we had just been…the self-perception that we were just being neglected really. We had some contact with people and afterwards, you know, is the funding available and…but it never really went anywhere. (E22).*
[254] *"…there should have been enthusiasm, a thrust in professional energy that wasn't there." (E18).*

going monitoring when using the grant, curtailed learning opportunities, especially concerning issues reaching beyond the scheme[255].

5.1.4 - Explaining Outcomes

This sub-section reports the opinions expressed by interviewees concerning the factors that explain the outcomes arising from APoC. Care must be taken to recognise that it is not possible to directly link the visible outcomes observed with any of the opinions expressed, they are simply expressions of belief that the point raised by the interviewee is, in some unknown way, a contributory factor to the outcomes.

The tender from the Managing Agent was selected because of prior experience, their devolved distribution model, and value for money[256]. Initial views suggest that marketing and the ability to reach and support potential applicants from anywhere within the region were critical, especially when supported by prior experience of offering this type of scheme. Even where this was considered important, the proposed distribution model, making use of 'local' contact points surrounding a 'central' hub appears to have been the most important factor[257]. Adopting a targeted marketing approach was also influential[258].

Applicant success was attributed to the clarity and simplicity of the application procedure and the scheme overall[259], rather than the inherent quality of their proposal. The handling initial enquiries and providing support to complete a formal

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[255] *"Had there been a requirement for there to be a monitoring officer for some of these things maybe we would have got a bit more out of it, particularly if they saw their remit as beyond APoC." (E33).*
[256] *"…that distribution model meant that [the Managing Agent] had much more coverage than other bids who were purely centrally focused upon one location and hoping through marketing, to reach all corners of the region." (SM01).*
[257] *"It must have been value for money to…for a start, because they do examine it on…on that sort of ac…you know, sort of, jobs, GVA, all that sort of thing in terms of value for money, and price, but I think it was the novelty about getting to market." (SM14).*
[258] *"…we would suggest to people, you know, this is an absolute fantastic opportunity if you are to apply, but we'd obviously identified good businesses that we thought would need the support, you know…" (SM03).*
[259] *"…clarity, having a sort of easy, clear guidance as to how these things work." (E11).*

application acted as a filtering mechanism that weeded out enquiries and submissions that did not meet the stated criteria[260]. Networking was regarded as a key element[261], whilst the availability of the grant at the appropriate time was a factor contributing to success in some instances[262].

From a Scheme Management perspective, the success of the scheme was attributed mainly to the people involved[263]. The make-up of the grant awarding panels reflected an industry perspective and brought in specialist technical knowledge[264]. Learning mainly took the form of formal research simply to keep pace with the technologies being developed[265]. From the perspective of grant holders the aim of the scheme and achievement of expectations were influential[266]. The grant was a facilitator of success, providing the means for relevant activity to be undertaken[267]. Experiential learning occurred for enterprises, especially those who were unfamiliar with business[268]. Classic 'learning by doing' came to the fore, although support was on hand from a BDA[269].

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[260] *"…it all depends how…how used they were to applying for things ….. but usually you would, sort of, sit down with them and say okay, this is the application form and we'd go through every single section with them, explaining to them what this meant, and what they wanted done, and, of course, by that time we knew what their idea was…" (SM11).*

[261] *"…the primary mechanism of the networks delivered the right numbers and calibre of project opportunities from the businesses. That was the main mechanism." (SM06).*

[262] *"Timing is everything." (E32).*

[263] *"…it just worked and it's because of the personnel." (SM15).*

[264] *"We had SMEs represented on the panel to make sure that there was that commercial voice there and we had technical specialist because, with the greatest will in the World, there is no way that we could have in depth knowledge of all the technologies we were looking at, so we felt it was important that we had people who were more au fait with various technical sectors than us." (SM01).*

[265] *"It was necessary to get up to speed very quickly on quite specific technologies. They were often being developed by World leaders in their field so just to be able to converse with them on a fairly pragmatic level was challenging." (SM01).*

[266] *"…my view of APoC was that it was a mechanism to promote entrepreneurial innovation and realising proof of concepts, and it did that." (E04).*

[267] *"…it was a mechanism to promote entrepreneurial innovation and realising proof of concepts…" (E04).*

[268] *"It wasn't a structured, formal learning exercise in any way shape or form, but that was definitely something that I became much more aware of, the business nature of the industry, rather than the technical nature of it…" (E01).*

[269] *"…one of the reasons I think it was valuable, because it's very easy to convince yourself that something is a good or a bad idea, when you have to convince somebody else who doesn't understand your idea at all and is just thinking of it from a purely business perspective." (E01).*

It is not possible to confirm a causal association between any of the factors identified and the various statements of value added. Scheme Management attributed value added to flexibility, subject to using the grant for one or more the qualifying activities[270].

The contribution of freedom to act was also noted by Enterprise interviewees[271]. Some attributed added value simply to the availability of resource in the form of finance[272], whilst others cited the tangible outcome of having funding available to enact decisions made[273]. Additionally, reduced timescales that enabled decisions to be enacted earlier and the consequences of those decisions consequently experienced more quickly also gave rise to added value[274]. Both enhanced the amelioration of perceived risk[275].

The essence of successful innovation was interpreted as producing added value through extending existing knowledge, technology, or applications[276]. Ultimately, the cause of value added for many grant holders was that the grant facilitated a development that would not have occurred otherwise, because cash flow would have been insufficient[277].

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[270] *"…it allowed companies to actually diversify, develop new products and services and to reach a different market, and therefore either grow, safeguard jobs, but certainly not disappear." (SM15).*
[271] *"APoC allowed us to make the decision that actually it wasn't going to go anywhere…" (E11).*
[272] *"The money really. That allows us to make a step change in where we are in the state of the knowledge at the time." (E33).*
[273] *"We had the patent, which always adds value. It propped us up. It certainly impressed them when we could say we've got a very well written patent." (E09).*
[274] *"…the added value was in shortening the time to get the product to market and that is the key to it all. […] that was where the key benefit was…time to market and actually developing something that might otherwise get forgotten…" (E07).*
[275] *"I managed to get it done in, in, not as fast as I wanted, but a lot faster than I realistically could ever have done without it, and that, that's made a big difference." (E01).*
[276] *"…there must be something different happening." (E02).*
[277] *"…it's brought into existence something that otherwise we wouldn't have." (E12).*

From the perspective of applicants and grant holders, failure meant being unable to bring their project to a successful conclusion[278]. Often failure was attributed to factors outside the scope of APoC[279], including economic conditions[280].

As may be expected unsuccessful applicants expressed concern that their proposal was considered not to meet application criteria[281]. Funding follow-on activity[282], the general state of the economy, the depth and length of the economic recession were perceived as a major obstacles[283]. In some instances, there were also difficulties amongst management that were cited as having an adverse effect on completion of the project[284]. Given the nature of the scheme it is not surprising that technical difficulties in development were perceived as obstructing progress[285].

Previous proof of concept schemes had gained a relatively poor reputation and some scheme managers questioned whether this would have a negative halo effect on APoC, even to the extent of questioning whether APoC should go ahead[286]. Fortunately, others did not share this view and saw an opportunity to offer a well-formulated grant scheme to assist enterprises seeking to commercialise new, innovative products and services. Although some alternative schemes had actually

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[278] *"…the added value would have been if it had worked, we went into it trying to create a business, and we got halfway and got stuck…that technology is still there, the project is still there and someone could still take it and do something with it so it's not really a negative." (E14). "…the added value would have been if it had worked, we went into it trying to create a business, and we got halfway and got stuck…that technology is still there, the project is still there and someone could still take it and do something with it so it's not really a negative." (E14).*

[279] *"…my sales will be constrained by myself, not wishing to sell too many, rather than erm me not being able to make them." (E01).*

[280] *"…the economy has stalled…" (E04).*

[281] *"…our experience was, we…to be honest with you we did find it very, very difficult to crowbar in the idea that we wanted to do into that funding stream…" (E08).*

[282] *"…there was nothing following on from that, you know, for bigger projects. You know , there needs to be a follow through process…" (E29).*

[283] *"…the financial circumstances of the economy over the last four years haven't helped at all." (E03).*

[284] *"…you can have the best individual players but unless they are working together as a team you have not got a successful business or a successful team…" (E28).*

[285] *"…the technology threshold to overcome. The [name] technology did not work as well as we had all hoped, it was not as robust …" (E33).*

[286] *"…proof of concept funds have been around in the UK for some time and they've got a very mix…mixed reception, because some were pretty poor, poorly run, poorly devised and poorly delivered. And the general view in the UK was of a very mixed, should we do this, probably not…" (SM14).*

begun the process of supporting work towards proof of concept, they had experienced financial difficulties, which helped clear the way for APoC to be implemented[287].

It is clear from the comments made, especially by Scheme Management, that funding provided by the Regional Development Agency, taken from the Single Pot Regeneration Budget, was regarded as relatively unencumbered - being comparatively free of usage restrictions[288]. Finance drawn from the European Regional Development Fund was, rightly or wrongly, perceived in fundamentally different terms[289]. The administrative requirements associated with auditing and justifying the use of ERDF monies are perceived as overly complex and carrying a significant burden in terms of compliance[290].

The comments made by representatives of Scheme Management clearly oscillate between comparing the ease of use of RDA monies and ERDF monies for both the administrative burden within the scheme and from the perspective of compliance with conditions imposed upon grant holders/users[291]. In fact, APoC was designed very skilfully and grant holders were 'protected' from direct involvement in justifying the use of funding from either source[292]. Scheme Management carried the administrative burden of achieving compliance and simply relied upon grant holders/users to make

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[287] *"The fund got into difficulties, but had been used to begin an initial proof of concept fund…" (SM05).*
[288] *"I do remember when it was going through the application stage thinking that it was a very good idea, because of the Single Pot matching. This meant that we were maximising the amount of grant that we could give to the companies and it wasn't just being er spent on, you know, management and admin, if you like." (SM09).*
[289] *"…if you had a choice of ERDF money, or would I like AWM single-pot you'd go with AWM single-pot every time." (SM02).*
[290] *"ERDF funding was an advantage in that it was necessary to build up the fund but was a massive disadvantage because of the rules and associated bureaucracy. The complex administration certainly puts off companies from making a bid and was even a potential handicap for agencies wishing to bid to manage the scheme." (SM05).*
[291] *"…it's public money, it's got to be correctly policed,…because it can be abused if the wrong people are there…" (SM08).*
[292] "…I deal with the ERDF, like day in and day out and it's a right pain because of the stringent audit and monitoring requirements that you have to go through…" (SM09).

periodic data returns to show how funding had been used. Nonetheless, there is an inferred bias against ERDF in favour of RDA finance[293], even though some aspects of compliance led to improvements in business (enterprise) practice[294] [295]. The need to generate cash was arguably the most short-term influence[296]. A common aspect of product development was concern for achieving completion, both in as short a timescale as possible and of a suitable quality[297]. The economic situation was considered an important influence[298], manifested in changing regulations affecting product development and long-term requirements[299].

Scheme Management perceived themselves as being part of a newly created network embedded within a pre-existing support service network in the West Midlands region, of which all were already members[300]. Their comments indicated that they regarded membership of the APoC network as very important and were willing and active participants, able to bring their experience to bear on making APoC a success[301]. Nevertheless, each individual or organisation in the network still

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[293] *"ERDF is definitely no, a constraint. It's not something, yes it facilitates an awful lot of activity that wouldn't happen otherwise, don't get me wrong, but it is a huge constraint in how you can do things, it's very much a fixed level of activity, so it doesn't really matter whether you're managing frankly a 100,000 pounds of grant money, or actually a hundred million. It's broadly the same amount of grief…" (SM02).*

[294] *"I think it's good for companies to do that as it encourages them to go and look elsewhere 'cause lots of companies tend to stick to the same suppliers all the time, thinking that's the best deal, but, you know, after two or three years it may not be the best, so it's good practice for them to do that. I think at certain times it's not easy to get three quotes, if there's a specific job that needs doing and there's only one expert in the whole of Europe who can do it, well, you know you can't go and get three quotes in." (SM11).*

[295] *"…they make you get three quotes and everything, and it sounds a bit stupid but that actually really helped because we probably were a bit naïve with things like that and I wouldn't have done that had I not been made to do it…" (E12).*

[296] *"It's cash, so we live or die on cash." (E03).*

[297] *"…getting to realisation was the most important aspect of it and that's where my focus was…" (E04).*

[298] *"…basically the economic situation…" (E17).*

[299] *"…the [industry regulations] which I think was changed by the new government …" (E17).*

[300] *"…it's quite a good network that we all developed… (SM03).*

[301] *"All enquiries were recorded but not all were suitable for APoC and some were referred on to other schemes available in the area. Redirections were often mutual and this helped build a local network of providers of support who cooperated and collaborated in an atmosphere of mutual trust and respect." (SM05).*

ensured that their own contacts were properly informed of relevant developments, such as the initial marketing of the APoC scheme[302].

For grant holders, networking was enhanced through involvement with APoC. However, networking with support services was not uniform because not every applicant required the same level or forms of support; for example one applicant sought physical help in the form of additional staff, rather than advice or consultancy[303]. Additionally, applicants described very different experiences with the same support agency. It is not possible to maintain the confidentiality undertaking and use the actual name of the particular support organisation, however, it is confirmed that the comments do refer to the same organisation[304] [305]. The local support network was regarded as fragmented and operating inconsistently and intermittently[306]. Two different enterprise representatives expressed contrasting opinions concerning the support network in the region[307] [308].

Non-APoC, pre-existing network contacts proved useful, if not essential, to some grant holders and provided access to a wide variety of information and services required to complete the project[309]. Clearly, personal networks are developed

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[302] *"…nodes used their contact base to generate interest as did UWSP personnel and perhaps a consequence of this was that many of the enquirers were existing contacts of the organisations involved…" (SM07).*
[303] *"We don't want telling how to do things, we need the help to do it and that's where we're from; really." (E06).*
[304] *"…but [named support organisation]…was…they're only looking at doing what we already know, basically. So they were going over what we already knew. (E06).*
[305] *"[named support organisation], for example, is an extraordinary organisation. [named support organisation] is probably the organisation with the biggest talent in engineering advice in the area. People know about them." (E31).*
[306] *"I wouldn't even call it a network its bits and pieces, sometimes they are really active and it sort of disappears again. " (E17).*
[307] *"I felt that the West Midlands was particularly logical and open and accessible and I came here from the East Midlands partly because it was a better environment for accessing universities and for accessing grants and for helping universities to access grants." (E05).*
[308] *"It has been an up-hill struggle everywhere in the West Midlands except…but then you go to the North-East and it was…it was, you know, very very easy, streamlined process." (E09).*
[309] *"Whenever I think there is something, a lack of knowledge in my head, I just phone him up and say help me, what do I do, where do I go, how do I get myself into this position or out of this position. […] everything he has told me has been proven and it has worked" (E32).*

through experience within a particular industry[310]. Given the nature of the projects being supported and the need for technology development services, universities within the region featured strongly as network contacts[311]. Developing and maintaining the network is largely unstructured, relying heavily upon personal effort to locate appropriate contacts[312].

If APoC provided loan finance rather than a grant, interviewees would not have made an application[313]. In some respects this is an unfair comparison, since the grant was a material reality whereas the possibility of a loan was entirely hypothetical. Hence, it was always likely that there would be a heavy bias towards maintaining the grant provision. Other interviewees were less certain in their response[314]. There was a very strong preference for grant funding, partly because of the reduced risk and extra confidence that accompanies the grant[315].

The status of the venture and the enterprise significantly influenced attitudes towards APoC, other non-grant sources of finance and the decision to proceed/progress the

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[310] *"…as a consequence of that I've got quite a wide network of contacts within the region for people that actually work in the area of providing grants and commercial support to businesses." (E03).*

[311] *"…we were able to recruit very talented people; sort of punching above our weight in the recruitment market I guess because of our links to universities. We were able to get things done for free through universities in some cases on the understanding that it could lead to further research in the future." (E05).*

[312] *"…if you've not done things like that before you've got to sort of invent the wheel. You've got to finding out…like with the patent advice, we looked around for patent agents and we asked various people we know personally, people who have invented things and they went with so we went with recommendations. If you look at a list of patent agents in the Yellow Pages you don't know who's good and who isn't. So we found somebody who was really helpful and then you have to keep asking and keep finding out a bit more information. So in a way to actually do it yourself is possibly a bit better because you learn that you might also go down one avenue and waste lots of time and what have you…" (E17).*

[313] *"…we've been entirely self-fund as a business, we would never have taken a loan…a loan would have been even worse because then it's not your money because you actually using somebody else's money you're going to have to pay back with interest, that would be the worst scenario." (E23).*

[314] *"It's difficult to argue whether that's higher or lower risk. I don't see that it would be. I don't see that it would have made a difference." (E09).*

[315] *"…the benefits of the grant schemes are that it gives you that - just that little bit of confidence, more confidence to go about doing it without risking everything. […] grants are great, they help us sleep a little bit easier at night because like I say that risk is reduced…" (E28).*

project[316]. The special circumstances of university technology transfer departments, who might have been able to draw upon HEIF funding or other governmental sources was also influential[317]. There might be some conflict in these situations because academic researchers do not always intend to create a business from their research, and if one is created, it is likely to be a spin-out venture[318].

For successful applicants, the supplementary source of funding was generally internal and took the form of either Director's loans or retained funds from other operations[319]. One larger enterprise had a portfolio of funding available, of which APoC was regarded as one source[320]. Non-grant sources of funding were also used for non-qualifying activities, in addition to providing general working capital to maintain the project[321]. One interviewee regarded the existence of grants from public funds as *quid pro quo* for the return that would be made to Government and society once the project was successfully completed[322].

Unfortunately, APoC was brought to a premature close as a result of changes in government policy for business support and the closure of Regional Development Agencies. With the loss of the major source of funding there was no alternative but

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[316] *"…we had shall say we had a figure in mind of what we could invest as a company and…that route gave us the best option in terms of…what we had put up front and literally as a company we could afford X amount of thousands of pounds of investment and then we wanted to add onto that actually create enough of a fund for [subcontractor] to do the job properly within a six-month timeframe that we were giving them…" (E14).*

[317] *"We used our Higher Education Innovation Funding from HEFCE, so HEIF is…what a lot of people call it. So it was a really good use of it from our point of view because it's Government funding in effect through HEFCE for universities to be more innovative and to get their products out there, to get them commercialised and being used; but obviously you have a limited budget to do that and so this enabled us to do more with it." (E13).*

[318] *"…at that early stage we wouldn't really be looking at a business coming out of it, or a commercialisation plan. The first stage would be actually to get it to the point where it's patented, and normally they file the patent and then the academic's got to do lots of extra bits of work before we get to PCT stage, to actually add more into the patent." (E11).*

[319] *"…it would be income derived from our existing [name] product and it would be basically probably Director's Loans from the Managing Director." (E13).*

[320] *"APoC was not the only, the only people that you had to plan your funding as well. So you don't have two different funds on the same one, you have to separate those in here." (E31).*

[321] *"…it has all come from personal input of my husband and I into the Company and a small amount of it has come from the Company itself, but most of it we have put the money in ourselves." (E32).*

[322] *"…a grant is a good thing because the Government can help you, but to you're going to pay a lot of taxes eventually, you're going to get people employed, you will add to this economy." (E31).*

to wind up the scheme and no further applications were accepted, although existing grant holders were allowed twelve months to draw down their remaining funds. There was unanimous agreement between Scheme Management and Enterprise interviewees that APoC had proved valuable and that the scheme would be greatly missed[323] [324].

5.1.5 – Summary of Key Issues Described

The issues raised in this summary describe key features of APoC that figure prominently in the following explanations of the scheme. No direct comparison has been made with any other support scheme. Consequently, it is not possible to confirm whether these issues are exceptional, but they certainly represent important characteristics of APoC.

The scheme was a local adaptation of a type of intervention found in other UK regions. The initiators had a clear focus on boosting local economic growth through addressing deficiencies in provision of support for innovation, in particular, funding for proof of concept activity. There was clearly a demand for this type of support with most interviewees bemoaning the absence of readily available follow-on funding for successful grant holders. Some, but not all, enterprise interviewees claim that APoC facilitated starting or continuing with their particular project, suggesting that they would have been unable to proceed without the grant and associated support. In some instances this was attributed to reducing perceived risk. The grant also had a positive effect on progress towards commercialisation, shortening timescales for development.

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[323] *"…having, you know, seen a good project into existence and believed that it was doing some good it was a disappointment that it wasn't possible to carry it forward…" (SM06).*
[324] *"I'm quite sad to see it go because out of all of the assistance that was available out there it's, it provided more support to more small companies to do more useful things than any other stream of government assistance that I witnessed, yet it was the one that they chose to close." (E01).*

The scheme was perceived as being managed successfully, achieving targets, and meeting expectations. Fundamentally, it provided an opportunity for someone to try to succeed, irrespective of whether it was possible for that opportunity to be fully developed. Developing prototypes and obtaining IP protection were stated as principal outcomes.

The scheme facilitated learning by the Managing Agent, who was able to benefit from the experience of others who had managed similar support services prior to APoC. Additionally, enterprise learning embraced the development of new skills and expertise, including specialist knowledge related to technology and/or research and commercial/business skills.

Enterprises receiving an APoC grant were perceived as more attractive to commercial funders for follow-on funding. Additionally, APoC grants also facilitated access to other strategic development opportunities, including participation in consortia.

Both Scheme Management and Enterprise interviewees attributed the development of network relationships to APoC. The quality of the support provided varied, although the scheme facilitated access.

There was a wide variation in the professionalism of management in enterprises. This appears to be related to the size and age of the enterprise and the prior experience of management. Management described intangible positive outcomes arising from receiving an APoC grant, noting especially a boost to morale and confidence. The emotion expressed on hearing of being successful and receiving a grant was particularly striking.

The outcomes identified are indicative of several plausible causal mechanisms that required further investigation. Firstly, the mechanism that made public funding available for grants from Regional and European sources coincided with a preference for grant funding, rather than loans or equity investment amongst target enterprises. However, it is also clear that alternative sources of funding for the type of activity supported were extremely limited.

Secondly, the Managing Agent was selected because of their perceived experience in operating a devolved distribution model that offered the potential for effective region-wide coverage. Their tender was seen as being successful because the mechanisms they had in place offered both devolved localised delivery, balanced with strong centralised control. This appears to mirror Peters and Waterman's simultaneous tight-loose properties (1983, p.318-327) that are promulgated as one of the key dimensions of successful organisations operating in dynamic contexts. Devolved delivery facilitated the integration of finance and support, which was perceived as a principal causal influence on project success for individual enterprises. Additionally, devolved responsibility boosted collaboration and cooperation across the network of support service providers.

Thirdly, the operating mechanisms put in place by the Managing Agent were perceived as instrumental in ensuring both flexibility in applying the terms and conditions attached to grants and in timing the availability of the grant to best advantage for each individual successful applicant. Since each applicant was required to contribute at least 25% of the projected cost of the project, a sense of commitment was developed and heightened motivation. Other key operating mechanisms include the use of 'independent' decision-making panels, comprising perceived experts, and facilitating experiential learning through active engagement.

Finally, inability to consistently ‘pick winners’, by identifying applicants who would definitely succeed, inevitably led to some failures. Three key plausible causal influences on failure are identifiable: the poor state of the economy limiting opportunities for growth; poor skills within enterprises; and limited working and investment capital.

5.2 - Stage Two – Analytical Resolution

Sub-section 5.1 - Stage One – Description began the process of drawing together closely related issues that share common foundations and influences. Emphasis was placed on factual reporting of descriptive material, enabling sub-section 5.2 – Stage Two – Analytical Resolution to identify components that formed plausible causal relationships influencing APoC and the outcomes that arose. The analysis focused upon powerful particulars, generative mechanisms, structural conditions, and actions that interrelate either to facilitate or constrain activity, both within and arising from the scheme.

Objects in social science can be simultaneously perceived as individual phenomena and elements of general structures. Stage two differs from stage one by highlighting cooperative and counteractive mechanisms which, in combination constitute unobservable structures establishing the context which influenced the observed outcomes arising from the scheme. As indicated previously in Section 5.0 - Findings- the researcher exercised judgement in interpreting descriptions and combining elements to reduce the number of components taken forward for further evaluation. Reduction inevitably entailed some loss of detail and care was taken to ensure accuracy was not compromised. However, advantage was gained in terms of manageability and enabling the components taken forward to be thoroughly analysed and understood.

Analytical resolution was divided into sub-sections, grouping together related material. Sub-sections do not reflect real distinctions between content and were created purely to aid communication. Cross-references to earlier sub-sections and verbatim quotations evidencing the argument developed are given in brackets.

5.2.1 - Context and Concept

APoC was created because support services available in the West Midlands region did not stimulate adequate levels of activity to increase gross value added (5.1.1 – SM02). Senior staff constituted the 'powerful particulars' who initiated the development of the scheme (5.1.1 – SM06, SM12). The region was underperforming comparable regions in the UK despite there being a fundamentally sound infrastructure (5.1.1 – SM10).

Access to finance was identified as a principal barrier to the development of early-stage innovation-led businesses and APoC was conceived as a facilitation mechanism to provide funding for targeted businesses pursuing, designated activities (5.1.1 – SM01). The scheme provided grant funding to qualifying applicants and was intended to bridge the gap between an enterprise having access only to internal funding and being able to attract external funding on commercial terms (5.1.1 – SM01).

The key *modus operandi* was the distribution of grants provided principally from two sources, Single Pot Regeneration Budget and European Regional Development Fund (5.1.4 – SM02, SM05, SM09). It was recognised that there was no equivalent funding for early stage development within the region, either in the private or public sector (5.1.2 – E33).

APoC targeted both new and existing businesses with innovative projects that had commercialisation potential (5.1.2 – SM15). It sought to fill the gap left vacant because other funding providers regarded early-stage innovation-led business as too risky (5.1.1 – SM01). The principal aim was business activity that returned benefit to the region (5.1.1 – SM08).

Analysing descriptions of the scheme and evidence derived from verbatim quotations obtained from interviewees (sub-section 5.1 –Stage One - Description) suggested the following issues were key causal influences in developing the initial concept:-

a. Characteristics of the West Midlands Region;
b. Views and opinions of like-minded individuals;
c. Coordinating role of AWM;
d. Challenges of funding early-stage innovation-led business development;
e. Preference for grant, rather than loan, provision;
f. Absence of an equivalent, alternative scheme available at the time;
g. Availability of funding from UK Public Funding and ERDF.

The four categories of context and contextual influence discussed earlier in sub-section 3.4 – Empirical Activity may provide a useful framework to summarise the initial context when APoC was conceived and developed as well as highlighting the evolving influence of context as the Scheme came into operation and was forced into premature change. Context also provides a background framework for subsequent, detailed analysis of plausible explanations for observed outcomes.

The contextual influence on, and of, individuals is, by definition, individual; for example, personal circumstances and experience specific to each person, but some general observations can be made. Involvement in APoC is triggered by interest in innovation and commercialisation whether from a participant or support service

perspective. Analysis, discussed throughout this section, showed that participating individuals had an interest in technological research, and were drawn to APoC by a number of different influences. Individuals in support services were influenced by the attraction of addressing employment issues, especially the comparative impact of low wages and low corporate valuations manifest in the West Midlands region. APoC offered a potential to add value.

In terms of interpersonal relationships at the time of engaging with the Scheme, and reflected in data analysis and interpretation, for many participants the support of family and friends, together with their collective circumstances was highly personal. Some participants communicated their gratitude to their family, whilst others sought to provide for their family through successful innovation and commercialisation. There was no known interaction between individual participants prior to engagement with APoC, although there was some individual contact with Scheme Managers through previous involvement with support service providers. APoC fostered some interpersonal contact through events arranged by Scheme Managers for grant holders and those successfully completing their projects.

Institutional settings was a principal contextual influence with the tripartite relationship between Advantage West Midlands, University of Warwick Science Park and selected support service providers acting as distribution nodes being crucial in Scheme design, development and operation. This relationship was made possible by the influence of Government policy concerning the regional implementation of support policies. Each party shared a desire to boost regional GVA and provide employment opportunities, although it was not possible to restrict use of grant funding to expenditure only within the region. The relationship also compensated for weaknesses at AWM who did not possess the necessary skills and experience to manage a publicly funded intervention such as APoC but sub-contracting scheme

management to UWSP solved the problem. Nevertheless, AWM still remaining highly influential in defining target sectors, supported activities, performance measures, and performance criteria. Over time, the institutional setting evolved and matured providing a strong foundation for devolved implementation and responsibility through nodes. Nodes played an essential role, using their networks of contacts to market the Scheme, acting as the direct interface with participants, as well as providing Business Development Advisors with the skills required to provide direct support to applicants. The close partnership that evolved also formed a network of mutual support that benefitted applicants.

Infrastructure on its own probably epitomises the common perception of context. Government, as reflected in policies and mechanisms that facilitated the development of the Scheme at a regional level and enabled public sector funding to utilised, and the performance of the economy were crucial influences. The Scheme was conceived to address economic underperformance in the region compared to other regions of the UK. Not just in the West Midlands but across the UK there was/is a belief that innovation and commercialisation are contributors to economic development, growth, and prosperity. However, it was thought that a lack of public sector funding targeting proof of concept activity in the early stages of commercialising innovation and the failure of the private sector to make funding available on acceptable terms severely limited the potential for an otherwise healthy flow of innovation projects in the West Midlands to be converted into successful products marketed by successful new companies. Hence, the Scheme was conceived as a mechanism that could draw upon the support infrastructure, including the availability of public sector resources, to facilitate proof of concept activity in targeted sectors to overcome an obstacle early in the process of commercialisation, add value to companies, safeguard existing employment and create new job

opportunities. A less supportive infrastructure may have discouraged the development and implementation of APoC

Singling out one element of infrastructure for further discussion, recessionary conditions had an effect on APoC, and its operations but this was not readily visible in the interviews conducted with participants. Shortly after APoC was conceived and just at the time the Scheme was implemented, the economy weakened as a result of a financial crisis. The immediate impact was probably to increase perceived risk amongst participants which may have been reflected in more cautious attitudes towards undertaken innovation projects without proven success potential, but no strong evidence was gathered. Recessionary conditions were occasionally cited by participants as factors in the decisions they made to engage with APoC, when explaining and justifying the decisions made concerning the use of grant funds, and in accounting for the outcomes of innovative activity. It seems highly likely that recessionary conditions obscured underlying trends in innovation by putting a brake on the rate of developments that might otherwise have taken place, although there was no strong evidence of this from the comments made by interviewees. The situation also provided an easy explanation for less successful outcomes than might have been expected preventing some participants from needing to face up to their own shortcomings. As all structural conditioning, relationships were/are dynamic and the impact of the recession evolved over time impacting consequent relationship within APoC. However, recessionary conditions worsened during the life time of APoC with no signs of recovery.

There is no clear evidence that recessionary conditions affected the conduct of this research. It is possible that in less recessionary conditions there may have been more grant applicants, but there was an absolute limit anyway, although not reached, because of the defined amount of funding available. Paradoxically, more applicants

may have been willing to engage with the research if they felt less busy and less pressurised because of lower levels of activity. However, no participant made a direct comment to this affect. Recessionary conditions were hardly mentioned during interviews and the researcher did not create a coding node, suggesting that mentions were at best, infrequent, and possibly indirect. Of course, the participants interviewed retained sufficient activity to engage with APoC and the recession might have been a stronger influence deterring enquiries and/or prospective applicants, but there is no substantive evidence to support this view. In summary, recessionary conditions were no more or less significant than any other contextual influence on the programme, the participants or the conduct of this research. To the extent that recessionary conditions were the subject of interviewee comment, most seemed to simply accept that they were operating in recessionary conditions not of their making and over which they had no influence. The few comments that were made suggested that interviewees regarded recessionary conditions as something which only Government policies could influence and there was disappointment that little action was being taken to ease the situation.

Arguably, the financial crisis was an influence on the change in Government policy that resulted in the early closure of the Scheme and seems highly likely to have been influential in the availability of public sector funding and the tightening of conditions imposed by private sector finance providers that constrained the potential to develop a follow-on scheme to replace APoC. There did not appear to be any adverse effect on the flow of potential innovative projects and belief in the role of innovation in economic development, growth, and prosperity appears to remain undimmed, but changing infrastructure, especially manifested in recessionary conditions increasingly led to infrastructure becoming a constraining rather than a facilitating influence on the Scheme.

5.2.2 - Scheme Design

The Managing Agent designed procedures, informed by the tender document outlining the required characteristics, expectations, and anticipated outputs that had been drafted by AWM (5.1.1 – SM01; 5.1.2 – SM04). Proof of concept funds already existed in the UK and both positive and negative aspects of previous schemes (5.1.3 – SM13) influenced the design of APoC.

APoC targeted local needs and adopted tight control procedures, essential for justifying expenditure from public funds (5.1.4 – SM05, SM09). The successful tender was based on a networked distribution model with devolved responsibility under centralised control, which maintained the advantages of ensuring consistency across the region, whilst simultaneously ensuring the involvement of existing support service providers (5.1.4 – SM01). The outcome was an effective network of local partners able to respond flexibly to local needs (5.1.4 – SM06).

Centrally managed marketing, supported by local promotion was effective in attracting sufficient applicants of appropriate types (5.1.1 – SM15). There was consistent demand throughout the life of the programme, indicating an unsatisfied need, especially in the northern area of the region (5.1.1 – SM09). The quality of applicants attracted was sufficiently high to ensure effective distribution of grants (5.1.3 – SM04, SM09).

There was a wide variety of reasons for applying (5.1.2 – E01, E10, and E33). A multi-stage application procedure, following guidelines established by the Managing Agent (5.1.1 – SM06) and applying criteria for progression (5.1.2 – SM07) helped maintain control. It was also an effective filtering mechanism (5.1.4 – E11). Initial referral to a local partner ensured the application procedure was fully explained to each applicant (5.1.2 – E19). Even the application procedure itself was perceived as

valuable to applicants (5.1.2 – E12) because it prioritised stages considered significant in the process of commercialisation. Implementation through local partners allowed sufficient local variation and flexibility to maintain the focus of the scheme whilst reflecting the specific needs of applicants (5.1.2 – E19).

Allocating a local Business Development Adviser (BDA) to every enquirer who proceeded beyond initial contact ensured consistency in support to applicants, and helped harmonise the standard and style of application (governed by a formal application form and procedure) (5.1.2 – SM13). BDAs were responsible for delivering a presentation to the decision-making panel, although this meant that the decision-making panel did not meet the applicant (5.1.2 – SM10). Additional support, where required, was available from local providers (5.1.2 – SM08). Close working with a BDA may have helped ensure consistency, but probably accentuated feelings of disappointment among unsuccessful applicants who had reached the final stages with an expectation of being successful (5.1.3 – E08).

Partners made initial decisions concerning which applications should proceed; the Managing Agent was responsible for due diligence, and an independent panel of experts was appointed to make award decisions (5.1.2 – SM02). The Managing Agent retained responsibility and exercised control through training and the use of an independent observer to verify consistency across panel meetings (5.1.2 – SM07). Use of decision-making panels helped provide transparency and maintain independence, which applicants appreciated (5.1.2 – SM07).

Analysing the description of the scheme and integrating evidence derived from interviewees (sub-section 5.1- Stage One - Description) suggested the following issues were key causal influences on the design of the scheme:-

a. Motivation of key influencers – ‘powerful particulars’;

b. Aims and objectives;

c. Experience, knowledge and skills of partners;

d. Opportunity to offer a well-formulated scheme to fill a perceived funding gap.

5.2.3 – Scheme Operation

Centrally planned and operated administrative arrangements were crucial to effective operation by fulfilling facilitation, control and reporting functions (5.1.1 – SM15). Most interviewees recognised the importance of good administration in effective facilitation, although some cited aspects of the administrative procedures as obstacles (5.1.3 – E04).

APoC provided grant funding because it was perceived as more attractive than a loan (5.1.4 – E23) and reduced risk (5.1.3 – E01). Public funding imposed requirements to justify expenditure but, even though the audit requirements, especially for ERDF funds, might be perceived as uninviting, the availability of funding made the scheme both possible and viable (5.1.4 – SM05).

Facilitation included easing access to support services as an integral element of the partners' responsibilities (5.1.3 – SM13). Partners constituted a newly established sub-network embedded within the pre-existing support network, of which all were already members (5.1.4 – SM03). All had prior experience of offering support services, provided by themselves or accessed from within the network (5.1. 2 – SM06). Membership of the APoC network was highly regarded and created extremely motivated partners (5.1.2 – SM15).

Flexibility was crucial to being able to tailor support to the needs of participants. This led to a variety of views concerning the most useful sources of support, the value, and quality of support provided, and the relationship between support providers and

APoC partners (5.1.2 – E09 and 5.1.4 – E17). Scheme Management regarded support provision as at least as valuable as providing finance, but Enterprises regarded the grant as the most important output from the scheme (5.1.4 – E33).

Specifying qualifying activities maintained a focus on contributing towards the commercialisation of innovative products and services (5.1.4 – E11, E13). There was flexibility in both the interpretation of meaning and recovering qualifying costs of engagement in specified activities (5.1.4 – SM15). Grant holders did not have to engage in all five activities and did not have to make use of providers or subcontractors within the West Midlands region (5.1.2 – SM08).

Applicants were required to submit an activity plan, showing how they would engage in qualifying activities, as an integral element of their application. The majority found their plans unfolding in line with expectations. Nevertheless, it was essential that APoC allowed flexibility in implementation (5.1.3 – E22).

It was expected that grant holders would use at least their 25% contribution to complete their project. Private sector grant holders relied heavily on Directors' loans, retained earnings or profits from other operations, whereas university-based or technology transfer/knowledge exchange applicants were able to draw upon other forms of public sector grant funding (5.1.4 – E13).

Analysing the description of the scheme and integrating evidence from interviewee quotations (sub-section 5.1 - Stage One - Description) suggested the following issues were key causal influences on the operation of the scheme:-

a. Balance of centralisation against devolved responsibility;
b. Administrative processes;
c. Provision of support alongside funding;

d. Flexibility of partners to cope with variety amongst projects;
e. Flexibility of partners to cope with dynamism and change within lifetime of specific projects;
f. Situationally specific environmental, technological or people effects.

5.2.4 – Scheme Outcomes

There was unanimous agreement among interviewees that the scheme operated effectively, facilitated valuable outcomes, and should have been allowed to continue (5.1.4 – SM06). Few projects had reached full maturity by the time of interview (5.1.4 – E29).

Formal evaluation adhered closely to conventional quantitative processes, with key performance indicators defined in advance of implementation. Outcomes were measured partly by self-reported data from participants and partly from an analysis of claims for reimbursement of costs incurred when sourcing subcontracted services. Defined in these terms, APoC was judged a success, despite early closure and comparatively early assessment soon after the final cut-off date (sub-section 4.5 – Outcomes: According to Conventional Evaluation). As this research demonstrates, there were also many outcomes that were not anticipated in advance and which were not reflected in the pre-defined key performance indicators.

Personalised performance criteria and meaning varied from interviewee to interviewee (5.1.3 – SM04). The definition of a successful outcome also varied widely. However, three types of outcome were perceived as successful by interviewees:-

a. Physical outputs taking the form of either a prototype or a commercialisable product/service (5.1.3 – E12);
b. Gathering relevant information, possibly through testing (5.1.3 – E24);

c. Partial achievement of expectation, but progress from original starting point (5.1.3 – E31).

Both grant recipients and subcontract suppliers gained added-value benefits from APoC. These benefits took many forms, including tangible and intangible outcomes (5.1.3 – E28). Every enterprise which received a grant was able to cite some form of benefit; some reported receiving multiple benefits simultaneously. The variety of different forms probably arose from the flexibility of the grant and APoC processes, valuing benefits gained was contextually specific.

As indicated above, many forms of beneficial outcome were not captured by conventional evaluation. The pre-defined key performance indicators understated actual outcomes and their importance to individuals and specific enterprises (5.1.3 – E27). The diversity of benefits identified was reflected in the diversity of factors perceived as influencing outcomes. Beneficial outcomes arose from the combination of facilitating decisions made by the grant holders and the physical provision of resource to implement decisions.

Little informal feedback was reported by enterprises, but the comments received indicated dissatisfaction with post-scheme contact and support, and the timing of formal evaluation. Scheme Management experienced a sense of satisfaction when successful outcomes were achieved (5.1.3 – SM15). Not all outcomes were expressed by enterprises in financial terms. The majority of outcomes reported could not be linked directly and unequivocally to APoC, despite confirmatory comments from enterprises (5.1.2 – SM07).

Undoubtedly, APoC facilitated the implementation of decisions made by grant holders, which, in turn, facilitated progress towards commercialisation. The grant

enabled a variety of contextually specific elements to be brought together to enable progress including:

a. Timing of decisions to proceed (5.1.3 – E26);
b. Information, from market research (5.1.3 – E27);
c. Engagement in specified, qualifying activities supporting commercialisation, especially prototype development and securing intellectual property rights (5.1.1 – E07 and 5.1.2 – E18).

Accepting that APoC was the primary facilitation mechanism allowing projects to proceed, enterprises cited three principal sources of influence on the decisions they made. These included:

a. Finance; either the need to generate cash or the need to ensure profitability (5.1.4 – E23);
b. Product development; especially the need to ensure completion within a short period of time and cost control (5.1.4 – E32) and;
c. Environment/context; including the economic situation and awareness of threats to successful completion (5.1.4 – E03).

The ways in which enterprises used APoC to address these influences varied enormously, according to specific context.

The grant enabled APoC to reduce perceived risk, boost the confidence of applicants (5.1.4 – E28) and change the perception of the level of risk inherent in the project, making a decision to proceed more likely (5.1.3 – E01). Undoubtedly, being a grant attracted applicants who would have been deterred by loans (5.1.4 – E23) and enabled actions to be taken sooner than might otherwise have been the case (5.1.3 – E33).

Learning was cited as a principal form of benefit emerging from the mechanism of facilitation (5.1.3 – E09) and arose mainly from involvement in activity. In addition to some action learning, reflective learning also occurred, both emerging from interaction with participants and, in the case of enterprises, subcontractors. Both scheme managers and enterprises with a strong research background and comparatively little commercial experience gained valuable knowledge of business (5.1.3 – E21). Additionally, compliance requirements, imposed to meet the ERDF conditions improved business practice in some enterprises (5.1.4 – SM11).

Relationships have been important influences within, APoC (5.1.3 – E24). Partners formed an effective network of relationships that enabled engagement within their communities, whilst simultaneously being able to set aside any inter-partner competitive issues. They were able to draw upon contacts within their individual networks to bring in specialist expertise to assist grant applicants and grant holders, and to provide services needed to operate the scheme (such as serving on award decision-making panels). Despite some variability, some enterprises formed enduring relationships with partners (5.1.2 – E01). The APoC network did not replace pre-existing network contacts but supplemented existing relationships (5.1.3 – E09).

The strengths and weaknesses of APoC cited by interviewees were generally contextually specific, but probably arose from a combination of factors specific to the needs of each interviewee. Weaknesses for one participant were often replicated for another but cited as strengths (compare 5.1.2 – E09 with 5.1.3 – E16). Weaknesses and causes of failure were regarded as synonymous. Hence, weaknesses tended to reflect precise and specific needs that were slowing progress for the participant (5.1.3 – E26).

Not every applicant was successful and not every grant awarded produced positive outcomes (5.1.3 – E08). Failure to succeed was sometimes attributed to factors within the design or operation of the scheme (5.1.3 – E04) but factors beyond the control of APoC were also cited (5.1.3 – E23). Paradoxically, interviewees sometimes cited failures judged by their own personal standards[325], even though overall the scheme was perceived to be successful (5.1.4 – E14).

A number of counter-active forces created difficulties for both Scheme Management and Enterprises. Many of the counteractive forces gave rise to an empirical manifestation perceived as an obstacle to progress. Four issues appear sufficiently general to suggest the problem lay either within the scheme or its structural context:

a. Delays in contracting (5.1.2 – SM04);
b. Inability to include internal expenditure as a qualifying cost (5.1.2 – E12);
c. Absence of current and continuing funding (5.1.3 – E10).
d. The state of the economy (5.1.3 – E04).

Other issues cited were not an obstacle for the majority of enterprises and this suggests that difficulties were contextually specific. For example:

a. Being insufficiently connected with, or active within, local networks and, therefore, not becoming aware of the availability of APoC until very late (5.1.2 – SM08);
b. Inability to meet scheme criteria (5.1.2 – SM07)
c. Resolving technical issues (5.1.2 – E05);
d. Sales marketing activity (5.1.4 – E01);
e. Time period to output (5.1.3 – E17);
f. Personnel, including management difficulties (5.1.4 – SM07);

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[325] *"…it didn't really integrate you to the rest of the systems around. I think they should have been more hands on about what they did to actually support individuals and how they could actively bring other people in, other expertise, get, you know, collaborations working." (E02).*

g. Poor reputation of ‘proof of concept’ style schemes gained from experience of prior or parallel support scheme development (5.1.4 – SM14).

Overall, APoC provided an effective support mechanism that was flexible in providing an opportunity for both Scheme Management and Enterprises to make progress towards their objectives (5.1.3 – SM13). This reinforces the quality of the scheme design and operating procedures, and infers that APoC was managed in a well-balanced manner.

Analysing the description of the scheme and integrating evidence derived from verbatim quotations obtained from interviewees (sub-section 5.1 – Stage One - Description) suggested the following issues were causal influences on the outcomes achieved:-

a. Scheme design incorporating devolved responsibility;
b. Flexibility in application of scheme requirements;
c. Grant rather than loan funding;
d. Timing of the availability of funding;
e. The combination of support and funding;
f. Commitment and contribution from grant holders;
g. Scheme personnel including BDAs, award-panel members, and scheme administrators;
h. Motivation engendered in participants;
i. Contextually specific facilitation to meet participant needs.

5.3 - Stage Three - Abduction/Theoretical Redescription

Abduction begins the process of moving from the reported/recorded experience of interviewees to actual events. Actual events are not necessarily synonymous with a participant’s experience but reveal some of the structural and social contexts that

constitute generative mechanisms. There is no prescribed method for carrying out abduction with researcher interpretation playing the major role in an iterative process. The primary focus is identifying emergent powers necessary to trigger mechanisms giving rise to outcomes. Emergent power itself is not directly detectable empirically and must be inferred from the phenomena it produces – the effect it has on influencing actions and behaviour that give rise to observable outcomes associated with APoC.

For example, it was not possible to observe the emergent power of experience gained as a result of participating in APoC, but it was possible to observe the effect that experience had on a participant's understanding of commercialisation and the business-related activities needed to launch an innovation successfully[326]. It was, however, not possible to infer direct causality between a successful launch and prior experience because there are so many other influencing factors that must all be place before success can be achieved.

The researcher must exercise judgement when identifying plausible explanations of how and why observed phenomena arise, because not all identified mechanisms are necessarily influential. The researcher must remain within the subject's context, otherwise the analysis becomes situated within the researcher's context and the account, and explanation may be unrecognisable to the subject(s).

Differentiating between individual phenomena and general structures is essential when adopting an abductive approach to data analysis. Individual phenomena are always discernible through observation, whether purposefully structured or incidental. Naturally, individual phenomena may vary from case to case and context to context.

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[326] *"Without the grant the product would not be there, the equipment would not be there, the knowledge would not be there, the experience would not be there." (E25)*.

General structures are not directly visible/observable, even by purposeful observation, and tend to be uniform at any given point from case to case and context to context, even though they may change over time. Abduction helps to discriminate between the influence of general structures, rather than individual phenomena and, in turn, generative mechanisms, rather than incidental associations. For example, the generative mechanisms operating within general structures that influence the availability of public funding being made available to resource APoC (sub-section 5.1.2). However, the amount of grant awarded varies between applicants, within the scheme's parameters and illustrates an individual phenomenon arising consequentially from the operation of general structures.

Abduction redescribes aspects of APoC in terms of interviewees' meanings, interpretations, motives, and intentions to place ideas and plausible theories in context, with the intention of suggesting possible causal relationships. For example, based upon their observations of the support services one interviewee reported a lack of appropriate specialist support[327]. Their comments indicated that their experience of direct enquiries and the recommendations of contacts operating in another region suggested that region was superior to the West Midlands because specialist support was available[328]. General support services were available in the West Midlands but they had been unable to locate a specialist they needed in the area. The structural and social context was that the availability of limited public funding dictated that support could only be provided for the most popular services. Experts might have been willing to travel from another region, but it was likely that

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327 "I went to them first because that was part of the rules, you know, was to seek MAS and everything else. I never spoke to anybody there who seemed to really point me in the right direction or even comprehend what it was that I was trying to do. It was a…it was a bit of a flop really and I've heard nothing but similar things from every other person whose ever tried to use them." (E09).
328 "A model similar to the one in the North East. What I'd like to do is move to the North-East without having to move to the North-east, you know! I'd want that to come here and support me here." (E09).

relocating to the other region to access expertise would prove advantageous for the enterprise, albeit with the loss of innovative activity to the West Midlands.

Whilst the previous sub-sections, 5.1 – Stage One - Description and 5.2 – Stage Two – Analytical Resolution, addressed empirically verifiable phenomena, this sub-section marks the beginning of the transition from empirical phenomena towards abstract conceptualisation, by exploring the relationship between data and theory. For example, empirical observation showed that some applicants elected not to advance their innovative project until an APoC grant was awarded (5.1.3 – E33). Theory suggested that perceived risk is an obstacle to making the decision to go ahead with a project that offers an uncertain outcome (5.1.3 – E32). It may be inferred from the sequence of events for some enterprises[329] that the theory remains valid. The award of the APoC grant alters the perceived risk inherent in the proposed project, such that the decision to proceed is now regarded as constituting an acceptable risk when balanced against the potential outcome (5.1.4 – E28).

Abduction deepens analysis, providing explanations of the behaviour observed. The conventional application of abduction in critical realism identifies instances where empirical observation is incongruent with the accepted theoretical framework thought to underpin the phenomena being researched. Incongruence sheds light upon new possibilities that might contribute towards explanation. For example, accepted theory suggests that innovative product development leads to patent applications to protect commercial exploitation of the new product by the developer. However, there are clear examples within APoC where patents could have, but have not, been applied

[329] The initial decision not to proceed, followed by applying for and being awarded a grant, followed by a revised decision to proceed.

for and obtained[330]. Where empirical observation and accepted theory are congruent, this tends towards confirming the veracity of the theoretical framework, and certainly several applicants did go on to obtain, or had already obtained, patents to protect their innovations (5.1.2 – E09, E18).

5.3.1 – Key Participant Groupings

Analysing meaning, interpretations, motives, and intentions was nuanced at the level of the individual. However, it was appropriate to engage in a level of aggregation that reflected generalities found for groups who shared commonalities of understanding, sense-making, purpose, and aim. The interviewees were divided into eight principal categories; four Scheme Management and four Enterprises, experiencing different outcomes. The following categories covered fifteen Scheme Management interviewees:-

a. Scheme Designers;
b. Scheme Administration;
c. Business Development Advisors;
d. Node Managers[331].

The following categories cover thirty three Enterprises interviewees (thirty six enterprises), as explained in sub-section 3.4.1.1 –Semi-structured Interviews:-

e. Grant recipients;
f. Grant offers not taken up;
g. Grant applications rejected;
h. University Technology Transfer staff.

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330 "I mean intellectual property development, development of patents and suchlike; yes, that could have resulted and it would have been nice if it had; it still might…" (E33).

[331] The categories 'Business Development Advisors' and 'Node Managers' both included at least one interviewee who also took part in award panel meetings. Some interviewees fulfilled more than one role or contributed towards aspects of scheme activity additional to their principal role, as categorised.

Whilst the groupings themselves were clearly mutually exclusive, University Technology Transfer staff sought grants on behalf of university-based researchers working towards creating enterprises arising from the commercialisation of research undertaken within the University. The interviewee did not reflect enterprises in the same way as an entrepreneur in other categories might have done. Additionally, Technology Transfer staff interviewed all sought grants for more than one enterprise and experienced different award decisions. Hence, their comments recognise the differing perspectives of grant holders, applicants who received a grant offer but were unable, or chose not, to take it up, and those whose application was rejected.

The following sub-section reports the researcher's interpretation of the meanings, interpretations, motives, and intentions of each of the eight categories listed above.

5.3.1.1 – Scheme Designers

The Scheme Designers were SM02, SM04, and SM06. They perceived APoC as providing finance and access to support services. Grant award decisions were not synonymous with investment decisions, because no direct return to the finance provider was expected[332]. Although not in a position to directly commercialise innovation, this was perceived as the meaning of the scheme, from their perspective[333].

Intervention involving an injection of funding was thought to enhance innovation and the rate of business growth[334] based upon a recognised need for proof of concept activity that was not, immediately prior to APoC, covered by public sector funding

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332 "…we call it an investment panel, it was actually an investment of a grant, rather than, you know, somebody else's fund, rather than it being a true investment decision…" (SM02).
333 "…what we wanted to do was to create new businesses, create new products, new processes etc…" (SM04)
334 "Whether the return on investment ultimately pays off is another debate, but in terms of generating new business growth at a much faster rate than you would have done without it, it is fairly generally accepted that it has a very positive effect." (SM02).

provision[335]. This was interpreted as indicating that the innovation support services in the West Midlands were inadequate, because potential developments were *"…languishing…"* rather than being supported and progressing[336].

Scheme managers sought to boost growth in selected clusters that could bring growth to the region, based upon evidence already obtained from prior surveys of regional need[337]. This embraced the removal of early-stage restrictions that could prevent enterprises preparing for later injections of funding that would be the key to achieving growth[338].

The intention was to create a responsive framework that was flexible to local needs[339]. This clearly steps beyond their role, but crystallises the meaning of the scheme from their perspective. Making use of a devolved distribution system was intended to capitalise upon shared belief in the opportunity for innovation in the region and make use of expertise readily available[340].

5.3.1.2 – Scheme Administration

The Scheme Administration interviewees were SM01, SM03, and SM15. Helping enterprises diversify and protecting jobs were significant motivations[341]. The use of decision-making award panels was perceived as an indication of independence from

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335 "…one of the identified needs was to have some sort of proof of concept fund activity, which at that time wasn't covered by the grant for research and development to any significant degree." (SM04).
336 "…it simply was to release much more of the innovative potential from within the region. Those things that were not too far away from being commercialisable, how did we accelerate them into the market? Because I sensed that there were a lot of things around that were simply languishing." (SM06).
337 "…you're looking to build new companies that can augment those clusters. That wasn't to say that actually if they didn't neatly sit in one of those clusters they were immediately denied, but that was the guidance we were given in the original tender…" (SM02).
338 "…the overriding thing was we wanted to make sure that we didn't end up with a funding gap in this rather important area of activity, because the stuff which comes out of this type of activity feeds applications into venture capital funds, business angel networks, and things of that sort, so this early stage stuff, which can then get taken through, but without that happening then you sort of start to restrict the amount of stuff that's coming through." (SM04).
339 "…what we're trying to ensure always, on all of this, was responsiveness." (SM02).
340 "…the primary mechanism of the networks delivered the right numbers and calibre of project opportunities from the businesses. That was the main mechanism." (SM06).
341 "…seeing businesses diversify to safeguard jobs was very rewarding." (SM15).

the influence of scheme management. Additionally, the composition of panels meant experienced members of the community with contemporary knowledge were actually awarding the grants[342]. Whether an applicant could benefit from the opportunity was a separate issue.

The comparative lack of activity in the region immediately prior to APoC was interpreted as evidence that private sector investors were not willing to invest until the level of risk associated with early-stage innovative enterprise had been reduced[343]. Additionally, APoC was interpreted as successful in identifying the best available opportunities to support innovative enterprises available at the time[344], whilst the demand for grants was perceived as an indication of an unsatisfied need in the community[345].

Scheme administrators intended to support enterprises in their efforts to overcome recognised barriers to growth and to prepare a large number for equity funding at the end of their projects[346]. However, APoC was not intended to distort the market for finance, which would continue to operate normally[347] and hence, pump-priming early

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[342] *"…the grant award panels were incredibly valuable, through bringing together groups of individuals who knew of each other and were operating in parallel but were not necessarily meeting together on a regular basis. And those linkages again, for the benefit of the companies who were coming through were…were incredibly important and led to a number of businesses that we funded then going on and achieving subsequent funding elsewhere." (SM01).*

[343] *"There was clearly a difficulty for private sector investors to invest in early stage technology businesses when those businesses had not got sufficient evidence to support the investment, and that evidence tended to be in proof of principle in terms of technology, markets validation, appropriate patent protection, understanding commercial expectations in the market place." (SM01).*

[344] *"And, all of those things, to do them properly, to do them in a relatively independent fashion, cost money, and that's where this particular initiative was targeted." (SM01).*

[345] *"It was obvious that there was a massive need out there for this sort of funding ... because, right from the very beginning we seemed to have the required amount of ... of ideas at each panel, and we even had to put additional panels on as well." (SM15).*

[346] *"…this was a large volume attempt to lift a whole tranche of companies up to make it easier for the equity funds to pick the winners down the line…""…this was a large volume attempt to lift a whole tranche of companies up to make it easier for the equity funds to pick the winners down the line…" (SM01).*

[347] *"…we were very keen that we were not distorting the market in any way." (SM01).*

stage innovation was intended, at a stage before external investors would be willing to inject finance into the venture[348].

5.3.1.3 – Business Development Advisers

The Business Development Advisers were SM07, SM08, SM09, SM10, SM12, and SM13. APoC was interpreted as a regional example of a scheme that reflected a national theme[349]. BDAs interpreted their role as assisting the applicant, irrespective of whether assistance extended outside the remit of APoC[350]. The BDA role was perceived as helping an applicant fit their project proposal to defined criteria, providing they believed the project proposal had merit, irrespective of whether the project satisfied the aims and objectives of APoC[351]. They were crucial in preparing applications, inferring that applicants were perceived as being unable to produce successful applications without help[352].

Support for early-stage innovation was perceived as a route to growth, bringing employment and wealth to the region[353]. A need to attract enterprises engaged in technology development, regarded as synonymous with high growth[354], was perceived.

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348 *"…as far as I was aware there wasn't much for this early stage …" (SM15).*
349 "…it's not unique to the West Midlands, so I am supposing that it's an application built around a, kind of, like a National theme that was thought to be a good way of proceeding." (SM13).
350 "…we're there to help the company, not ... not just to assist APoC to run it's scheme." (SM10).
351 "…there is the, sort of, ... there's a kind of question over whether my role was simply that of an advocate to champion the particular company's application or whether I was also in there as part of the ... the filtering system as well, and I ... was comfortable in taking on both aspects but I, for sure, it was never explicit where I should be sitting in that." (SM13).
352 "The Business Development Advisor played a crucial role in tailoring applications to fit the specification. Here, the experience of the BDA was important in ensuring a good conversion rate." (SM05).
353 "It was then seen, as is now, that the way out of the recession is to assist some of these very early stage ideas, try and grow the business, provide employment, provide wealth for…for the region." (SM08).
354 "…it was targeting ... technology ... companies which are technology and development companies and, on the basis that the ... the powers that be have already defined high growth companies as being something we need to ... to ... to encourage because that brings jobs, and high-growth companies can come out of these areas." (SM12).

The decision-making panel process was regarded as maintaining the independence of grant award decisions[355]. However, one BDA did not accept that the initial intention underpinning APoC was evidence-based and carried conviction[356]. The role of the decision-making panel was interpreted as safeguarding fairness and transparency[357]; however, some BDAs believed that there was inconsistency between the treatment of applications given by the two panel groups – North and South[358].

The five selected target sectors were considered the most likely to have an impact on business growth in the region[359], with the grant reducing risk for the applicant[360]. BDAs interpreted feedback from applicants as indicative of the scheme being well-received as a valuable support intervention[361]. Some believed that the support services provided alongside the grant were at least as beneficial, if not more so than the grant[362]. The specification of target clusters was considered too rigid and indicated that applications not in accordance with the stated specification were rejected, no matter how worthy the project might have been[363]. However, some.

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355 "I think it was transparent, because of the panels; it wasn't me making the decision, or anyone from APoC making the decision, it was really the panel that was deciding what was going to happen…" (SM10).
356 "I'm not convinced that there is any real analysis or conviction behind those original set of words. And, certainly it doesn't really get followed through all the way through the process to ... to the delivery." (SM13).
357 "…the panels had to be there to demonstrate to the sub-regional organisations and to AWM that the process was fair and transparent." (SM07).
358 "There was a difference between the North and South panels in terms of decision making as the South were more rigorous in their analysis and questioning of each application. This can be explained to a certain extent by personnel and the South seemed to have more people with a financial and equity investment background." (SM07).
359 "…the reason they chose those five sectors is because it's probably the biggest and the... would have the most impact on the region by supporting those five sectors. So, I think it was fine." (SM09).
360 "…the APoC grant meant that this risk was minimal to the company, or not as risky, I should say " (SM09).
361 "I think the process was felt to be pretty good and I think they were very pleased that they had somebody visiting them to understand their business and to talk through the process as well." (SM08) "I am a proper fan of the process that was established for running APoC and it's value as a ... as a business support scheme." (SM13).
362 "We considered that the support that was given to them was as beneficial, if not more beneficial, than the actual money they got." (SM10).
363 "…they never got through the first hurdle, if they didn't fit into the priority areas that AWM wanted us to…" (SM10).

BDAs were motivated by both the desire to help innovative enterprises who were unable to secure funding from any alternative source[364] and the prospect of securing successful outcomes because the scheme added value[365]. Other motivations cited included supporting growth-potential businesses in the region to drive up gross added value[366] and the drive to assist applicants, even where they believed that the latter did not wholly share the objectives of eventual commercialisation[367].

The intention to process applications and award grants quickly, to avoid any unnecessary delay in progressing projects was perceived[368]. This extended to supporting projects at an early stage, before the success potential of the project had necessarily been demonstrated[369]. One BDA cited their intention to develop a longer-term, expanded relationship with the applicant[370].

5.3.1.4 – Node Managers

The node managers were SM05 and SM14. Enhancing job prospects in the region by both safeguarding existing employment and creating new employment

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364 "I really, really wanted to back the companies 'cos I thought it's the companies that know what the consumer wants, it's the companies that live and breathe it." (SM09).
365 "…I think that APoC was a very good model for business support…the process for APoC was, for me, a much more attractive process to go through for a company than GRD. I think the process was a successful and effective process…I don't think it could have been much better than it was. You know, of all the support schemes that I've been aware of in my, sort of, seven years in this game, I think that APoC was the…the best and the most effectively delivered and so on.…" (SM13).
366 "…by creating businesses that are going to grow and employ more people. The gross value added of those businesses has been increased by the injection of money from APoC ….. considerably." (SM10).
367 "…sometimes I was aware I was working on something which the researchers probably thought 'here's another way of getting a grant' (laughs) and I need to sort of fit it in such a way to try and get it through the system. I was aware of that, I wouldn't discourage that because they all ... unless I thought there is no potential in this at all, no market potential in this ... I put it forward…" (SM12).
368 "…the overriding objective was to get applicants through the process and grants awarded early on in the project so there was no slippage against targets." (SM07).
369 "I thought the concept was excellent, because there's a lot of ideas that go by the wayside, because people don't know where to go and no serious investor is interested in putting money into anything until there are certain proof points and one is that the concept is right." (SM08).
370 "…you're not just going to go and talk to that person just about Proof of Concept Fund, you'd do all of the other things that you can offer as well, all of your other services. So it makes you wonder whether or not the Proof of Concept was a very nice way of getting your foot in the door, to then build up that relationship." (SM09).

opportunities[371] was perceived as essential. Additionally, APoC was regarded as synonymous with connectivity by ensuring uniform coverage across the region [372]. Their principal motivation was meeting local needs[373].

High-technology enterprises were perceived as synonymous with growth in employment[374]. The APoC process was effective, had good transparency and made and communicated decisions promptly[375]. Node managers functioned as conduits to communicate information between the applicant and the scheme, and assisted in ensuring there was a mutual appreciation of the scheme and the applicant aims and objectives[376].

APoC was intended to be a mechanism to shorten time scales to market and to accelerate innovation and commercialisation[377], whilst simultaneously, preparing enterprises for later investment[378].

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371 "…facilitating hi-tech industries was important, the crucial issue is providing employment. It is not clear whether this includes both creating new jobs AND safeguarding existing jobs, although it appears that APoC scheme management were really interested in both." (SM05).
372 "…our connectivity's really strong…" (SM14).
373 "…probably favoured more open criteria that would enable better targeting of local needs." (SM05).
374 "…facilitating hi-tech industries was important, the crucial issue is providing employment. It is not clear whether this includes both creating new jobs AND safeguarding existing jobs, although it appears that APoC scheme management were really interested in both." (SM05).
375 "Overall, the process was effective. It gave good transparency and led to fairly quick decisions being made, although that does not necessarily mean that all decisions were for grants to be awarded." (SM05).
376 "To work with the client, to help them put forward a proposition, but really to ... to help them articulate what they'd got. So, sit down with them, talk to them about what it was, what they wanted to do, whether it fitted the bill and, you know, what they could achieve from it." (SM14).
377 "…have those products and processes that were funded by APoC created some new sales, created more jobs, created some more GDA? Has it helped that company get from a to b faster than it would have done beforehand? Has it got them to develop something new they wouldn't have done beforehand? Has that created more jobs?" (SM14).
378 "APoC speeded up crossing the divide to enable equity investment to be forthcoming. APoC may not have helped everyone directly but certainly facilitated movement towards business angel funding. APoC certainly accelerated some high technology opportunities, but may also have prolonged the life of others that only went on to die a little later. As always, the difficulty is identifying the companies that will become 'winners' that will make the type of return to the economy that is envisaged." (SM05).

5.3.1.5 – Grant Recipients

The grant recipients were E01, E04, E09, E10, E12, E14, E15, E16, E17, E18, E20, E21, E22, E23, E24, E25, E26, E27, E28, E29, E30, E31, E32, and E33. Most perceived APoC as the key to proceeding with their project[379]. For one interviewee it was the only grant pursued fully[380]. APoC was regarded as promoting entrepreneurship and innovation, and facilitating proof of concept[381]. Some interviewees regarded receiving the grant as an endorsement that the project had value and was worth pursuing[382]. The grant provided a mechanism that reduced risk to the point where a decision to proceed could be made[383], and accelerated the process of innovation[384]. Receiving the grant triggered a definite commitment to completing the project[385].

For most interviewees, APoC facilitated access to local support service providers[386], but their reported experiences varied considerably, from positive[387] to negative[388]. Several interviewees interpreted their experience as a learning curve[389]. There were different interpretations of the activities to be undertaken when engaged in proof of concept activity, ranging from the need to consider both technical and commercial

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[379] *"…it was really the basis really to start the whole thing, to produce the goods show it to the market…" (E25).*
[380] *"…we've applied for TSB grant since then and we are actually doing an application at the moment but, you know, APoC's the only grant I've had that I've gone the whole hog with." (E23).*
[381] *"…it was a mechanism to promote entrepreneurial innovation and realising proof of concepts…" (E04).*
[382] *"…it makes you a bit more confident; that is really probably the biggest boost…is that, well, people cleverer than me have said 'yeah, we can see where there is a possible business there'." (E30).*
[383] *"…to enable people to take on these sorts of projects which they might otherwise have decided because of the degree of risk not to do." (E22).*
[384] *"…it did enable us to take products to market quicker than we would have been able to so maybe one of the greatest facets of it was just being there." (E26).*
[385] *"…it forced you into the commitment of doing it." (E04).*
[386] *"…all the support we have had has been fantastic. Whether it has led to a successful product or not it has helped us. It has helped our employees, whether they have left here and gone on to other things. They have certainly developed as a result of being here and the vast majority of them have stayed in the area, so it's created more equality; an opportunity for others to move into whilst those guys have moved on." (E28).*
[387] *"…people can criticise MAS and Advantage West Midlands all they like, but they did their job; they got the job done…" (E07).*
[388] *"I don't think there was any sort of support, sometimes you sort of grants they've almost like a Dragons Den where you get training on stuff as well but I don't think there's anything like that" (E17).*
[389] *"…a very large learning curve is probably what I would describe is what I have gone through…" (E30).*

aspects[390] to only technical aspects[391]; commercial aspects always followed technical[392]. No representative considered proof of concept to be concerned only with commercial aspects.

Interpretations of APoC included:-

a) a 'game' driven by 'rules'; the task was to make an application that adhered to the 'rules'[393]
b) restricted because of the specification of designated themes[394].
c) boosting the value of enterprises and bringing peace of mind in continuing with the project[395].
d) a motivating mechanism that ignited the creative spark[396].
e) inflexible, because there was really only one level of funding, although some variation was possible within that level up to the maximum allowed[397].
f) a mismatch between applicants and APoC personnel, who were regarded as business not technical specialists[398].
g) a mechanism to illuminate opportunity, whilst at the same time lowering perceived risk[399], but the processes were very slow[400].

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[390] *"…in essence we did prove that what we had postulated was feasible both economically and technically…" (E33).*
[391] *"It means that it's basically proving that something you've thought might work can actually work." (E12).*
[392] *"…just to prove that the actual theory that ultrasound could enhance the [application descriptor] was true or false, that alone. The commercial aspects for me would have come at a later stage" (E14).*
[393] *"…you have to learn how to play the game and that was part of the adviser's expertise in explaining to me…" (E01).*
[394] *"I think the problem with that sort of grant is that it's a themed grant…" (E07).*
[395] *"It boosted the value of the company from both a financial and a security viewpoint and it boosted my peace of mind with the whole idea and encouraged me to keep going with it because I saw what it could do…" (E09).*
[396] *"…got us motivated, moving if you like, but it was that spark, that start." (E15).*
[397] *"I would like to see funding at different levels, may be are an incremental basis that if you achieve X then you can get a Y" (E20).*
[398] *"…one of the things with the business adviser is they are business advisers, they're not technical specialists…" (E21).*
[399] *"…we thought we could see an opportunity and we wanted to prove it, we wanted to prove it to ourselves, and it needed something doing that we wouldn't normally do, and it would need to be done in a way that we wouldn't normally do, and it needed to be done, in some sense it needed to be done so that we could be critics of it, and say if we had done it ourselves, it would have been a piece of work, which would have been providing the answer before it was finished." (E27).*
[400] *"…the time taken has been an immensely long time…" (E24).*

h) a flexible support scheme that reduced time to market[401].

i) a scheme designed by bureaucrats for bureaucrats[402], but nonetheless, providing some useful support for innovative enterprises[403].

The differing interpretations showed that the scheme had an appropriate level of flexibility to provide a useful level of support that was sufficiently specific to the varying needs of applicants. Of course, the data analysed in this sub-section is drawn only from grant recipients and it is not possible to determine whether any applicants were deterred by any of the negative interpretations given here. It is assumed that every enquirer would have proceeded with an application, had their proposed project met the qualifying criteria.

Many commented that they were motivated by a grant, but would not have been by a loan[404]. Although this appears to have been the overriding influence, other motivations were also cited:-

a) APoC enabled grant recipients to meet a challenge and solve a problem[405].

b) APoC helped the grant recipient to further their particular technology[406].

c) Company culture emphasised quality which accorded with the philosophy of APoC[407].

d) Independence and the freedom to pursue something innovative[408].

e) Obtaining equity funding from external sources[409].

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[401] *"Yes we could but it would have taken longer. It would have taken significantly longer." (E26).*
[402] *"I think you can see it has been drawn up by bureaucrats and by government employees, you know, public employees, not people in industry." (E31).*
[403] *"…a grant is a good thing because the Government can help you but to you're going to pay a lot of taxes eventually, you're going to get people employed, you will add to this economy." (E31).*
[404] *"…I just wouldn't have done it. Don't need more debt…the loan would not have been a goer." (E04).*
[405] "We all phone each other up saying I've got a problem; can you help me solve this…" (E10).
[406] *"I applied for the grant….purely on the basis to help me shall we say further my technology…" (E20).*
[407] *"…the [name] family have their name above the door and they are the quality of the market. I have to be absolutely 100% comfortable that these guys are not going to be let down by us producing shoddy product and they will not get into, we will not sell a product, we will not develop a product, that is not right up there of the highest quality." (E26).*
[408] *"…I enjoy doing what I am doing, being my own boss, looking to do something new and something different, building a business, building something I suppose. I have never been the type just to go in and earn a living and come home at five o'clock so generally in that way, I suppose driven in that way, I suppose in the same way sports people are driven to do what they are doing." (E28).*

There were two primary intentions when applying for APoC; firstly prototype development[410], and secondly, product/market testing[411] with the aim of creating a world-class business[412]. Not all grant holders intended to go on to develop a full business venture[413], although others explicitly cited their intention to create a successful venture that would employ others[414]. A wide range of different intentions were mentioned, although it did not prove possible for all respondents to achieve their intent. For example:-

a) using the grant to further management development[415]. Ultimately, the intention was to create a business that could be left as a legacy for children[416].
b) seeking external funding, but being unable to secure the finance required[417].
c) unable to find sources of subcontract supplies[418].
d) pursuing the challenge and achievement of making the technology work[419].
e) executing a tried and tested approach to product development[420].
f) seeing a successful product outcome[421].

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[409] *"…part of the reason why I got equity, saying "Oh APoC stands behind you" and they can invest into the development, and I have other vcs standing behind me so that all added to the pot and getting the money." (E31).*
[410] *"We expected it to help us develop a prototype for an idea that we had for a different kind of probe that we wanted to develop." (E12).*
[411] *"…we had those three things going on at the same time. The marketing, I'm not sure the order of scheduling but the marketing, the construction of the [component] system and the build of the test equipment." (E22).*
[412] *"I do not want this business to just be frittered away and sold. I want it to grow and be the best there is in the world I want us to be a world-class company." (E32).*
[413] *"I never intended it to be a business in its own right, it's a, it's an item that I wish to sell because I need one for the business of consultancy." (E01).*
[414] *"…we would hope we can build a business and employ people. That's what we're saying…to make a successful business and to employ more people in the future." (E22).*
[415] *"Management development; that did need a lot of attention but, that is difficult when it's a husband and wife team and family members…" (E06).*
[416] *"…a successful business to me if we could take in £250000 a year from running costs. I would like to go on because I always wanted to hand it over to my son and daughter…" (E06).*
[417] *"The funding just did not come. We were hoping that after the…after the project we'd have proven it sufficiently for lenders and that sort of thing and it really just did not seem to make a difference to them." (E09).*
[418] *"I do say in the application that we would get the design of the analyser done locally by a company in Birmingham, and also get the production of the analysers done locally, and that didn't happen; but I mean that was just because, when it came down to it, we just felt that the people we eventually chose were more technically able to do it and they then recommended a producer, you know, who were making electronics that they already were working with." (E12).*
[419] *"Challenge, the achievement, not even the money it's the achievement, it's to make it work." (E20).*
[420] *"…[we've] got a specific way of doing that from the initial getting requirements spec, producing technical specifications and circuit diagrams and print circuit board software we've done that lots and lots of times and it was just a case of running through the same techniques but for something for ourselves rather than somebody else." (E23).*

g) experiencing satisfaction in seeing their product in use[422].

5.3.1.6 – Grant Offers Not Taken Up

The applicant who received an offer of a grant but chose not to take it up is E19. They regarded APoC as a targeted scheme, but with sufficient flexibility to recognise high-potential applications that were not wholly within the specification. It was another example of the contribution AWM were making to business in the region[423].

APoC was interpreted as incorporating a rigorous evaluation process, more relevant than most but probably not placing enough emphasis on risk mitigation strategies[424]. It provided an independent view of the prospects for the project[425]. The actions of personnel associated with APoC were interpreted as indicating a genuine desire to help businesses succeed[426]. Unfortunately, evaluation took place far too early to be able to demonstrate outcomes[427].

They reported being motivated by the desire to create a success story in the West Midlands region. Unfortunately, their prospective business partner was not motivated to commercialise their product[428].

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[421] *"I want to see it succeed, I want the feeling of success. […] see the product being used is a good feeling and the money is nice too, but it's not actually the money..." (E24).*
[422] *"…to be able to walk down the street and perhaps see somebody using it and saying well I invented that, I made that, and have a sense of pride in myself and, you know, in some stupid small way, sort of trying to help the West Midlands…" (E30).*
[423] *"You know AWM were doing a good job in that respect." (E19).*
[424] *"I don't think the APoC guidelines asked sufficiently about in terms of the risk profile of your business is and what risk mitigation strategies you have out in place to mitigate against what risks." (E19).*
[425] *"The interaction with [named individual] was extremely valuable, very, very useful because it was just great to have a totally independent view of things." (E19).*
[426] *"These guys genuinely, genuinely wanted to see these businesses succeed and the scheme was geared to helping ensure that outcome." (E19).*
[427] *"…the timing of the evaluation process; way too soon in my opinion; way too soon. It's probably three, four, five years out that this stuff needs to be produced. All of the metrics about how many start-ups, you know, what is the gestation period or the survival period; it's three years or something like that. I'd look at it from that point and beyond and then let's see what number of these businesses that came back are one man and a dog business although there may be some real success stories out there." (E19).*
[428] *"My huge sadness is that it didn't ultimately come to pass and turn into a very positive metric and success story for the West Midlands, but…there we go." (E19).*

The applicant sought an independent view on the effectiveness of the proposed product and funding to secure IPR. They intended to use APoC funding to validate their business concept and develop a prototype[429]. The grant would have reduced risk, which should have increased the attractiveness of the project to external investors[430].

5.3.1.7 – Grant Applicants Rejected

The rejected applicants were E03, E05, and E08. Despite not making a successful application on this occasion, some respondents recognised that support services had been helpful and were extremely grateful for all the support they had received over previous years. The existence of the enterprise was attributed to that support[431]. However, whilst they supported the principal of targeted support for enterprises, they perceived very little plurality in progressing from grant to grant. APoC was simply the next step in a long process, but this did not diminish the disappointment they experienced when their application was rejected[432]. APoC was yet another support intervention in a plethora of small schemes, but they considered that a single, more substantial scheme would be more effective[433].

Naturally, interpretations focused upon the application stages of the APoC process, since these respondents had not progressed beyond this. A grant of up to 75% of

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[429] *"The first [objective] was the…the validation…The second objective, which we were going to use the APoC money for, was basically protecting the underlying IP. The third use, which was the one that APoC were most interested in, I think, was the development of a software demo for the system." (E19).*
[430] *"…the view that we took was that one of the ways of de-risking the project and increasing its attractiveness to Angel investors would be to access sources of grant funding; particularly to help with the validation work, the evaluation and validation in the classroom, and so on and so forth and to file patents etc., etc., which is where the APoC scheme came into play." (E19).*
[431] *"I'm immensely thankful for the funding that exists here, I think it's the reason why [company name] is here, is that, we've had the kind of support that we've had." (E05).*
[432] *"It seems like, at every stage, there was a pot for proof of concept, you would do that, you would spend exactly that much money and you would get to precisely this point and then you would go to the next type of grant. And there was very little plurality in that process." (E05).*
[433] *"…I'd go for larger amounts of funding as well. I think that would probably be more attractive to people, to have maybe 50, 60k." (E08).*

predicted cost was regarded as valuable support[434], but the application process was regarded as ambiguous, despite being based upon a template pro-forma[435]. The prof-forma gave a sense that the process itself was useful for new businesses with no previous experience of grant applications, but was less useful for more experienced applicants[436]. The application criteria were considered too rigid and the ratio of grant to effort required to secure funding too small[437].

Concern was expressed regarding the possibility of peer-group assessment of proposals leading to leakages of confidential material[438]. Formulaic evaluation at the end of the project was perceived as inappropriate for this type of activity[439], whilst the reasons for the early end of APoC were interpreted as signalling the demise of the support network across the country[440].

Reducing risk to the enterprise and undertaking activity that would otherwise be deferred through lack of resource[441] were cited as intentions when making an application. APoC was viewed as helping ameliorate the risk of leaving secure employment to create a new venture[442]. Interestingly, unsuccessful applicants were open in explaining their intentions, which included obtaining formal IPR to protect the

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434 "…although 75% is, is pretty good actually…" (E03).
435 "…some of the forms they're easy if you actually use them on a daily basis, if you're picking them up for the first time they're ambiguous." (E03).
436 "If it had been a founding grant for the business, the process of applying and not getting the grant would still have been extremely useful. For us as a business that was already somewhat established and trying to develop a new stream, the application process itself, while very good, and I respect it greatly, I don't think we benefitted from the process of applying and not winning." (E05).
437 "…I'd go for larger amounts of funding as well. I think that would probably be more attractive to people, to have maybe 50, 60k." (E08).
438 "…it would be assessed by my peers and my industry, it would probably be my competitors actually; that's what 'peers' means. So, that could be very tricky; I guess with every grant that's just something I'd like to flag up…" (E05).
439 "…evaluation isn't something you add on at the end. It is something that's formative, it's on-going, it's guiding and it's part of the design process." (E08).
440 "I don't think there is a support network anymore." (E03).
441 "…these grants do enable you to actually make expenditure or justify expenditure internally on something which you constantly defer…" (E03).
442 "…the biggest risk a person ever takes in business is the decision to quit their job and start a business. It's the kind of thing that I guess APoC can help with." (E05).

technology they had developed before looking for possible applications[443]. Another intention was to use the grant for activities that were essential, but rather expensive to fund internally. The grant would be insufficient to fund all the required activity, so additional funding would need to be sought[444]. Additionally, in some instances strategy was based on the assumption that development work would lead to an outcome which could then be licensed in the commercial market[445]. One respondent was motivated by creating a world first product/service[446] and they also wanted to develop the relationship between business and academia[447].

5.3.1.8 – University Technology Transfer Staff

E02, E11, and E13 were Technology Transfer staff. APoC was perceived as important in either moving projects forward, or making a decision to discontinue[448], given that the availability of money was perceived as the greatest need/biggest obstacle[449]. APoC meant extra resource, to which they would otherwise not have had access[450].

All regarded their role as supporting research development, but recognised the importance of commercialisation[451][452]. Proof of concept was seen as a stage in the

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443"I put in the APoC application along the lines of "We would like to investigate this new area and file new IP without thinking how to structure the business around that IP, yet." (E05).
444 "This was funding to help us to develop the project, so the idea was that we were going to put it against other funding…" (E08).
445 "We would have basically had the [product] and could have licensed it, like the plan." (E08).
446 "…the thrust of the challenge is doing something first, you know, making a world first, making, you know, the first stab at something, this is what really interests us." (E08).
447 "…it really opens you up to why that is such an important relationship between industry and academia." (E08).
448 "APoC allowed us to make the decision that actually it wasn't going to go anywhere…" (E11).
449 "Money generally really" (E11).
450 "…it gave me extra resource that I didn't have." (E13).
451 "…takes you from that sort of research start bit where you've got research with a possible commercial idea to the bit where you actually, yeah we have got an idea now and now we need to do something about actually driving it forward." (E11).
452 "We did get some insights into that…commercialising in that area and where the barriers were and such like. …well that just gives you some confidence in the numbers really, doesn't it?" (E13).

technical development process and there was a close parallel between proof of concept and prototyping[453].

AWM's actions in providing funding, then standing back and not automatically providing support, was interpreted as a lack of interest in seeing projects to completion[454]. Applying to APoC was perceived as useful training for other grant schemes because it provided a framework for structuring a proposal and funding bids[455]. APoC was a short intervention with no long-term follow-up[456]. However, it proved a useful indicator of project potential for continued investment of University time and funding[457].

The lack of funding for internal costs was thought to be discriminatory for university projects, because it was not possible to fund internal activities leading to prototype development[458]. Nevertheless, it provided funding to help plug an important gap in the development process[459]. Not surprisingly, marketing technology developed in the University was prioritised over job creation[460], especially where this helped develop

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453 "Prototyping is the key one because that's...um, proof of concept if you like is prototyping; one and the same thing…" (E02).
454 "I would say more concentration on proof of concept, perhaps slightly bigger grants which are a bit more meaningful, and in supporting them in terms of management. I mean, I don't understand why AWM gave the money and then just sort of left it; why they didn't actually act as gardeners or shepherds and actually help the process along." (E02).
455 "I have learnt how to go through that kind of process and I hope since, you know, we…we put in two TSB R&D grants and got both of them, we've actually learnt how to do grants in that kind of… So that must mean we've learnt quite a lot. Must mean that we learnt what the system wants; we've learnt how the system appraises it; we've learnt what to put and what not to put to get it. […] …enable me to structure an argument, to structure a pitch, and go through the process of actually thinking what do these people want to know, why, how, how do you deliver that. So it gave a framework for it."" (E02).
456 "…it was a short sharp intervention which was useful, but there was no long-term…" (E13).
457 "We did get some insights into that…commercialising in that area and where the barriers were and such like. …so we know whether to keep on investing time and money in progressing it." (E13).
458 "Prototype development, that was difficult because you weren't allowed to spend any of the money in-house, so there was an issue there that you couldn't." (E11).
459 "…it's that gap between research and actually getting in proper commercial funding where often you get stuck…there aren't many pots of funding around for that…that gap and that…that's really where it was beneficial, where we would have expected it to be beneficial." (E11).
460 "…we're not so interested in creating jobs, we're interested in getting University's technology out there." (E11).

links between universities and industry/business[461]. Other motivating influences included being a facilitator of action[462] and continuing to work in an effective network at a sub-regional level[463].

Interviewees regarded themselves as supporting others who were engaged in innovation, or research toward innovation. Consequently they intended to provide more direct support to participants, especially by participating in networked activities[464]. They favoured developing projects with an immediate application, rather than finding uses later[465].

5.3.2 – Fit with Contemporary Innovation Theory

Drawing on contemporary innovation theory, as discussed in sub-section 2.2 of the literature review, it seems likely that the majority of applicants engaged in a process that typified the commercialisation stages of simpler, linear sequential evaluation models. Some might have been sufficiently large and mature to adopt an integrated approach, but limited resources probably dictate more caution. Therefore, Cooper's (1990, p.45-47) stage-gate framework probably provided a conceptual overview of the practice being followed, although as Cooper pointed out (1990, p.53), not every project must pass through every stage illustrated in their framework. The formal APoC application process imposed a requirement that all enquiries progressed through a 'stage-gate' style system, although there was no requirement for an individual enterprise to adopt a similar process for their own activity.

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461 "I think things to help facilitate getting the University and businesses together…part of the problem is the companies not coming to the universities…" (E11).
462 "…it was having the framework to be able to something, to achieve something." (E02).
463 "There's always room for improvement in these things but I think we work pretty well together in [sub-region]." (E13).
464 "…it didn't really integrate you to the rest of the systems around. I think they should have been more hands on about what they did to actually support individuals and how they could actively bring other people in, other expertise, get, you know, collaborations working." (E02).
465 "…we want to be able to create things that have an application that can go to market as easily as possible, rather than creating something and then looking for a market." (E13).

Knockaert ***et al.'s*** research (2013) appears particularly relevant, because of their focus upon new technology-based enterprises and the relationship between support services for innovation and commercialisation. Their findings (2013, p.94-95) indicated that new technology-based firms seeking to launch new products/service had a high need for marketing-related support services. However, APoC provided support at too early a stage in the commercialisation process for the majority of applicants to need marketing services.

APoC enabled grant holders to access all four of the principal innovation support service categories advocated by Heydebreck *et al.* (2000) in ways that were sufficiently flexible to meet Knockaert ***et al.'s*** (2013) recommendations. For example, the grant was a small contribution to finance and partially compensated for the relative absence of opportunities to finance innovation through internal sources of funds. The injection of funding was used mainly to acquire technological resources required to complete prototyping or consolidating intellectual property rights[466], which then became a valuable asset in securing second-stage financing. This may be explained by the dominance of technology and/or research-based applicants with comparatively low levels of appreciation of the importance of business skills in successfully commercialising innovation.

One of the characteristics of APoC noted previously (sub-sections 5.3.1.5 and 5.3.1.6) was flexibility in responding to wide-ranging and differing needs exhibited by applicants in the context of their specific project. Hence, Knockaert *et al.'s* research fits closely with APoC philosophy and activity.

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[466] *"…it is for technical purposes and to support investment in the patents as I say at the time of applying…" (E16).*

5.3.3 – Summary of Key Points Arising From Abduction

Abduction highlighted a number of issues that infer either general structures or individual phenomena that were indicative of the context in which APoC took place. General structures are equally relevant for all groupings of both Scheme Management and Enterprises. Individual phenomena are, naturally, specific to individuals, but for the sake of clarity, and noting the comments concerning aggregation made earlier (sub-section 5.3.1), only phenomena shared amongst several individuals in the same grouping are summarised here. The issues highlighted constitute the tacit, not often articulated, *"…mutual knowledge…"* comprising symbolic meanings and implicit rules that structure social interaction (Giddens, 1984, p.334-343 and Giddens, 1993, p.95-97). Mutual knowledge helps develop implicit theories that, when shared with others, guides action in a tacit manner, allowing meaningful interaction. Often, social interaction only surfaces and explicitly recognises tacit theory when conflicting interpretations lead to challenging the accepted norm; for example, where Scheme Managers and Enterprises make differing assumptions concerning the validity of the perspective that technology enterprises inevitably lead to high growth outcomes. Conflict such as this may lead to explicit criticism that non-technology enterprises are subject to discrimination, even though support is being provided from public sources.

Elements of general structure include:-

a. Innovation and systems to encourage and support innovation were recognised as key elements of regional competitiveness, despite there being an absence of explanatory theory or empirical confirmation of a clear causal association in either direction. Private sector enterprises were considered most influential in engaging in innovation and R&D activity. Technology-related enterprises were perceived as synonymous with growth.

b. UK Government policy was orientated towards creating general environment conditions that favoured business. Immediately prior to APoC targeted support comprised mainly finance that was distributed through regional bodies, such as the Regional Development Agencies, or through national associations, such as the UK Science Park Association, who were free to use allocated funds to benefit local needs. This system of local distribution with devolved determination of target need enabled APoC to be created.

c. Public sector support partially compensated for private sector market failures. This was particularly relevant given belief in finance as the most crucial resource and the risk adverse attitudes of private sector investors towards funding early-stage innovation prior to confirmation of market potential through proof of concept activity. APoC was not intended to distort the market, which should continue to operate normally, but was intended to supplement limited availability, especially for early-stage pump-priming.

d. Public sector support was not intended to subsidise internal costs, but was expected to lead to innovation and growth in recompense. However, the provision of a grant was not synonymous with an investment that was expected to yield a direct financial return. Nonetheless, scheme designers believed finance would enhance innovation contributing to business growth, raising GVA, and employment.

e. Innovation was largely perceived as an institutional phenomenon, which does not fully recognise the role of the individual engaging in creation, invention, and entrepreneurship leading to new venture creation.

f. Proof of concept was not explicitly recognised as a separate stage in either a technology-push or a demand-pull linear sequential model of innovation. Instead, proof of concept activity takes place in several different stages, moving from a technological towards a commercial emphasis. At the time of inception, there was no explicit publicly resourced support for proof of concept activity.

Individual phenomena that demonstrably influenced APoC included:-

g. The designers of the scheme were motivated by attempts to boost economic growth within the region. This may be have been prompted by concern for local citizens, since it was recognised that the gross added value of companies could be improved, which, in turn, was thought to impact positively on jobs that were vulnerable to being lost. Previous survey research had reinforced this perspective.

h. APoC was a targeted support initiative in which commercialisation was the primary driver to protect existing employment and create new jobs. There was, however, some flexibility to customise activities to local needs. Scheme designers considered APoC to support the creation of new enterprises, products, and processes by providing opportunity, but not a guaranteed outcome. The scheme accelerated progress towards making decisions concerning next stage activity.

i. APoC was perceived as identifying and supporting the best available opportunities for growth available within the context of the scheme parameters. Scheme designers interpreted the demand for APoC as indicative of inadequate public support services and a failure of private sector providers that led to an unsatisfied need.

j. There was belief in APoC assisting enterprises to prepare for later stage funding and in enhancing the attractiveness of the enterprise to external investors. The award of a grant was perceived as reducing risk for investors and for entrepreneurs.

k. Peer-group membership of decision-making panels was intended to signal independence from scheme management, with the community making award decisions. This also reinforced fairness and transparency, but could have compromised confidentiality in specific circumstances.

l. BDAs believed that applicants needed help and support in completing a successful application. It was not clear whether this was due to ambiguity in the specification of scheme requirements, or a basic lack of understanding amongst the type of applicants attracted. BDAs perceived their role as helping applicants, irrespective of whether the project was a close fit with scheme requirements.

m. The provision of support services was regarded by Scheme Management as equally important as the grant. Contact made through APoC was a good route into up-selling related forms of support not covered by the scheme.

n. APoC depended upon connectivity to function effectively, although Enterprises noted a lack of plurality and integration between elements of support initiatives.

o. Enterprises perceived APoC as facilitating progression in converting ideas into realities. It helped overcome the greatest obstacle, lack of finance at an early stage. APoC was seen as synonymous with AWM's work in the region and its demise marked the end of the support network.

Other individual phenomena included learning, especially of business activity rather than technological; motivation to begin or continue; gaining confidence; overcoming challenges; and disappointment at the absence of continuing support.

5.4 - Stage Four - Retroduction

Retroduction is a significant aid to data interpretation in critical realist metatheory and makes a major contribution to identifying and explaining the factors and influences that make a specified phenomenon possible. As discussed in sub-section 3.4.3.2, retroduction seeks to explain observed patterns or regularities in terms of structures and mechanisms (Blaikie, 2007, p.83) by using inference to explore plausible, hidden causes of observed phenomena. It differs significantly from other modes of inference because it does not possess formalised, logical characteristics. In retroduction the researcher's *a priori* knowledge provides assumptions that enable theoretical prerequisites for the existence of the subject of the research to be questioned. Hence, *a priori* knowledge is essential and differentiates this form of inference from other modes[467].

This sub-section uses retroduction to provide an interpretation of APoC. It facilitates understanding of the necessary conditions pertinent to offering a grant in the context of contingent circumstances - bridging the defined funding gap.

5.4.1 – Practical Considerations in Applying the Principles of Retroduction to APoC

The primary purpose was to provide explanations, firstly, of why APoC was developed in its particular form, and secondly, of how and why it operated as it did.

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[467] In this research, the researcher's a priori knowledge, and assumptions concerning new product development, theories of innovation, and archetypal models of commercialisation provide a framework for analysing how APoC extended beyond theory.

Defining the scope of the data to interpret was the initial practical concern. Decisions made by the researcher, either implicitly or explicitly, created 'boundaries', both spatial and temporal, that defined the scope of the research to the exclusion of other issues deemed to be less worthy of detailed consideration. The purpose of abstraction was not to isolate particular elements or features but to emphasise and illuminate specific issues considered crucial to aiding understanding and explanation (Lawson, 1998, p.179).

By definition, the focus concerned the structures and mechanisms that influenced APoC abstracted from the general milieu of support services for innovation available in the West Midlands. The aim was not to provide a comprehensive explanation of all the causal conditions that have ever influenced APoC[468], instead the aim was to identify particularly significant mechanisms and structures that were influential in the period immediately prior to the development of APoC, until the time of writing. APoC comprised mechanisms that, within the prevailing structural context, helped enterprises better adapt to structural context, both in terms of reducing the impact of potential negative influences and boosting the activities undertaken towards commercialisation.

A second practical consideration was the identification of regularities and demi-regularities in structures and mechanisms that influenced APoC. Demi-regularities became evident through comparison and contrast across the range of activities and outcomes arising in close proximity, both spatially and temporally. APoC was

[468] Comprehensive assessment of plausible causal conditions might suggest that generative mechanisms closely related to natural selection (Darwin, 1859) are operating – organisms better adapted to their environment tend to survive and produce more offspring - and, in this context, APoC enhances the process of adaptation. Alternatively, Spencer's (1864, p.444) concept of 'the survival of the fittest' in evolution, which he used to provide a mechanical explanation for "…the preservation of favoured species in the struggle for life", is possibly more apposite. Here, enterprises receiving an APoC grant gained a fitness advantage vis-à-vis enterprises which do not.

considered a purposive attempt to deliberately create demi-regularities favouring innovative tendencies and any demi-regularities identified were contextually specific.

A third practical consideration concerned moving beyond the empirical observations already reported in sub-sections 5.1 – Stage One - Description and 5.2 – Stage Two – Analytical Resolution. Retroduction uses interviewees' descriptions as a foundation and moves forward to identify and explore the constitutive elements of general structures in order to seek plausible explanatory mechanisms. Descriptions of observed events are located in the experiences stratum of the domain of the empirical. The literature on depth ontology (sub-section 2.4.1) shows that while the empirical observations exist in the empirical domain and experiences stratum, the structures and mechanisms giving rise to demi-regularities exist within the real domain and mechanisms stratum. The challenge for the researcher is to transcend the events occurring in the actual domain, recognising that these are triggered by, and arise from, structures and mechanisms in the real domain. Transfactual/transcendental argumentation, focusing upon differentiating between pre-requisite conditions and contingent circumstances, assists in moving the research forward, by extending beyond mere descriptive accounts of participant experience[469].

The fourth practical consideration was differentiating between descriptive outcomes in the empirical domain and experiences stratum that can be, or have been, verified empirically, and description of the plausible explanatory mechanisms in the events stratum and domain of the actual, or mechanisms stratum and domain of the real that

[469] Interviewees reported making the decision to proceed with their proposed project after having been awarded a grant. The researcher is able to 'explain' these decisions in terms of reduced risk, increased motivation, and the interpretation of the decision to award the grant as 'expert' endorsement confirming that the innovation project has a sound commercial foundation. Counterfactual thinking begins the process of questioning the plausibility of the elements included within the explanation, and developing an understanding of possible alternatives.

may explain the outcomes observed[470]. Description for retroduction comprises detailed accounts of pre-existing structures, powerful particulars, trigger mechanisms, generative mechanisms, relationships, and consequent outcomes that can be taken forward for comparison and evaluation (sub-section 5.5 – Stage Five – Comparisons between Alternative Theories and Abstractions) in determining the best available explanation of observed outcomes.

5.4.2 – Explaining APoC through Retroduction

Critical realist metatheory recognises plurality in plausible causes of an observed phenomenon, particularly when the phenomenon occurs in an open environment. Drawing on Maxwell (2009, p.117) explaining causality is perceived as "…*fundamentally particular* […] *and an adequate understanding of how causes operate requires evidence about the contextual influences operating in the specific case."* The researcher recognised that a single cause is unlikely and APoC cannot be explained by simple determinism.

The search for explanation concentrated upon two specific aspects, three principal perspectives, and four phases that characterised APoC. Firstly, the two aspects are (a) why APoC was developed in its particular form and (b) how and why APoC operated as it did and produced the observed outcomes[471]. Explanation of the operation and outcome aspect also draws upon observations recorded through interviews, but relies on abduction and retroduction to illuminate plausible relationships giving rise to observed outcomes.

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[470] Observed outcomes are an integral element of retroduction, being the trigger that stimulates the search for plausible explanation.

[471] The two aspects are not mutually exclusive and there are strong relationships between the factors that influenced the development of the scheme and those that led to operational procedures being developed that created the generative mechanisms that gave rise to the observed outcomes.

Secondly, the three principal perspectives are: (a) explaining APoC as a single cycle of social interaction; (b) explaining the scheme in terms of mechanisms and structures; and (c) explaining the activities undertaken within individual enterprises.

Thirdly, the changing dynamics of four phases in the life of APoC within the explanations developed. Phase one marked the emergence of the scheme from specific challenges and circumstances affecting the West Midlands. A shorter, but no less challenging period, phase two, reflected the development of operational procedures. The third phase began with launch and lasted until the change in Government. Revised support policy then influenced the operation of the scheme through the fourth phase, until eventual closure.

Elements of each of the explanatory factors identified within the two aspects, three perspectives, and four stages were carried forward for comparison between alternative abstractions (sub-section 5.5 – Stage Five – Comparisons between Alternative Theories and Abstractions).

5.4.2 1 – APoC, TMSA and the Morphogenetic Cycle

The first explanation of APoC arises from an initial level of abstraction that envisaged the overall creation and operation of APoC as a single cycle of social interaction. Archer's model, based upon superimposing Bhaskar's Transformational Model of Social Action and the Morphogenetic Cycle (Archer, 1998b, p.376), provided a useful guiding framework (Figure 8).

The pre-existing structural conditions, which may be either unintended consequences arising from prior structural conditioning or the outcomes of deliberate actions, included the 'localisation' of stratified support for business, drawing upon public resources coordinated through Regional Development Agencies and the Business

Link network[472]. In the West Midlands, mechanisms pre-dating APoC did not explicitly provide public funding for proof of concept activities[473]. This created an obstacle for enterprises that sought to pursue innovation but did not have sufficient resources available[474]. Enterprises with a risk profile insufficiently attractive to secure financial support from private sector commercial providers became entrapped by structural conditions that they did not have the ability to overcome. Only the favoured few were able to progress beyond this point.

Over time, social interaction occurred between individuals who perceived the prevailing mechanisms as preventing innovative activity, causing a detrimental impact upon local job creation, safeguarding existing jobs, and GVA, and local business activity in general. The individuals concerned constituted the 'powerful particulars' that triggered APoC activity. As the individuals held senior positions in support organisations within the region it was likely that routine interaction was already taking place, but it was not clear precisely how or why the issues leading to the development of APoC were raised initially. Nevertheless, interaction must have been instrumental in creating a new initiative based upon shared perception of the needs of innovative enterprises.

Collectively, several existing mechanisms interacted to facilitate creating APoC. The mechanisms that enabled aims and objectives to be determined locally and target local priorities encompassed the mechanism to draw funding from public sources,

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[472] Support policy established mechanisms that enabled local provision to target small firms, innovation, job creation, and so on, as considered to best support the local economy, subject always to the requirement to justify the use of public resources in terms of benefits achieved for the community.
[473] Enterprises had to draw upon either or both limited funding from commercial providers and internal sources. Some non-financial support was available in the form of advice and consultancy, provided mainly by private sector enterprises, who received financial support through the RDA or Business Link.
[474] During this period, existing structural conditions remained unaltered, in morphostasis, with activities and routine interactions in the support services community continuing in line with, then, current guidelines, reproducing established mechanisms. The motivation of key individuals and social interaction between these individuals and institutions were the trigger mechanisms for change. Building upon existing mechanisms led to the development of a proposal to facilitate innovation amongst enterprises in defined sectors, subject to specified conditions.

including the European Community, the mechanism to utilise local networks in support distribution, and so on. Implementation of APoC transformed structural conditions through structural elaboration (morphogenesis). The scheme provided a mechanism to award a grant which enabled qualifying enterprises to overcome barriers and proceed with approved projects designed to engage in activities leading to commercialisation, boosting activity in the local economy and contributing towards job creation and safeguarding existing jobs[475].

The modified structural conditions subsequently proved to be ephemeral, however, as further structural elaboration, triggered by changes in government policy, removed the fundamental mechanisms upon which APoC depended. Another cycle began with social interaction taking place within an environment once again deprived of targeted, public sector funding for proof of concept activities.

Viewed in this way, APoC illustrates the basic tenets of analytical dualism (Archer, 1998b, p.375); separation of structure and agency, with structure necessarily pre-dating action to transform it and structural elaboration necessarily post-dating action that transforms it. The framework shows that the relationship between morphostasis and morphogenesis was continuous; there was never a period when the environmental structural conditions were not structured or unstructured, and with the precise nature of the evident structuration varied over time.

5.4.2.2 – Structures, Mechanisms and Relationships

Whilst providing a useful summary perspective that captured the critical circumstances, events, and outcomes, abstraction at the level of regarding APoC as a single cycle did not enable a sufficiently detailed exploration of pre-existing

[475] Undoubtedly, providing grants attracted some enterprises that were not dependent upon the funding, but yet, were able to take advantage of the newly created mechanism.

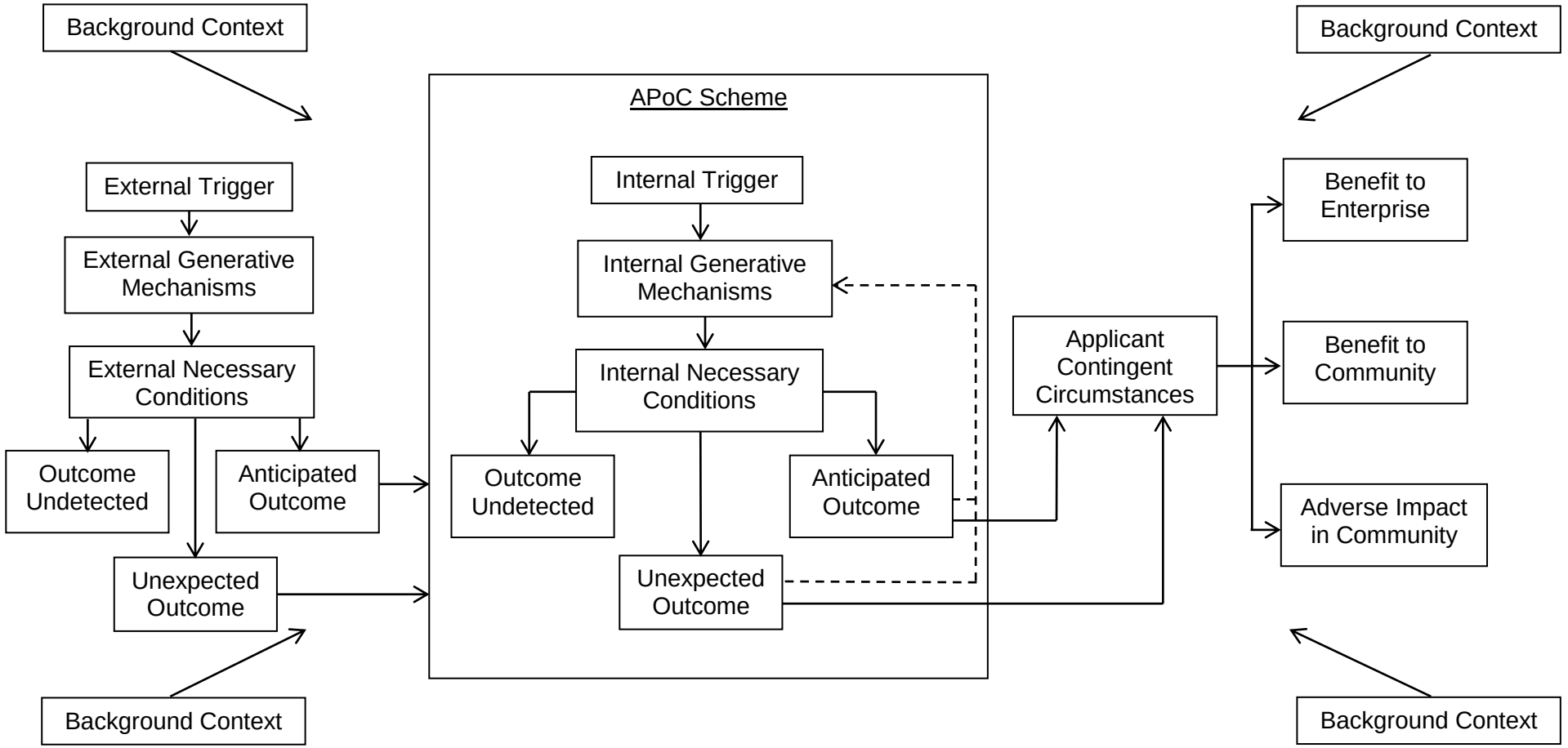
structures, powerful particulars, trigger mechanisms, generative mechanisms, relationships, and consequent outcomes to deepen the analysis. The timing of key events, and the key events themselves, did not change, but a second explanation grounded in a deeper level of abstraction enabled expansion and amplification of the issues identified by the TMSA/Morphogenetic Cycle model[476].

5.4.2.2.1 Background Context, Necessary Conditions, Contingent Circumstances, and Principal Mechanisms

Figure 19 represents the scheme and illustrates the influence of relationships between background context, necessary conditions, principal generative mechanisms, and outcomes. Background context described issues in the general environment that had an impact on innovation, such as an influence on economic development, or innovation support, as the provision of finance. Some issues had particular importance for the development and operation of APoC[477]. Necessary conditions differed from background context by defining specific criteria that must be satisfied in particular situations and which were not necessarily replicated in other circumstances[478]. Necessary conditions external to APoC, for example, the absence of public sector financial support for proof of concept activities, and those entirely within the scheme, such as the requirement to provide support uniformly throughout the region, were identified. Some necessary conditions defined factors influencing inputs, while others defined criteria satisfied by outputs. Generative mechanisms were defined in accordance with the critical realist perspective explained by

[476] Clearly, it is possible to continue to deepen levels of abstraction, moving ultimately to the context of considering each influencing factors on each enquirer/applicant, each partner, each BDA and so on, but this is considered beyond the scope of this research.
[477] For example, Government policy affecting support services.
[478] For example, demonstrating proof of concept is at the heart of APoC, but may not be necessary when accessing other support services.

Figure 19 - Schematic Representation of APoC



Blundel (2007, p.51)[479]. Three different types of generative mechanism were operative. Some are external to APoC; for example, the mechanism for devolving policy implementation to regional representatives. Others were entirely internal; for example, the mechanism to award a grant. The third was specific to prospective applicants. Where the output from a generative mechanism provided an input for another generative mechanism, the necessary condition that the output from the former must satisfy defined an input necessary condition for the latter. Outcomes were the results of causal power detected by human beings through experience or observation[480]. Contingent circumstances reflected the particular position of a specific enterprise or support service provider. Others were affected by similar contingent circumstances, but contingent circumstances did not have an even affect across an entire category[481].

Figure 19 illustrates the ubiquitous nature of background context, which simultaneously influences powerful particulars triggering actions in external generative mechanisms, as well as influencing internal generative mechanisms and constraining outcomes. The fundamental concept of the scheme satisfied external necessary conditions, overcame constraints, and delivered acceptable outcomes. The development of internal generative mechanisms was triggered by the need to respond to both external necessary conditions, such as the desire for growth amongst nascent entrepreneurs and inventors, and internal necessary conditions, such as collaboration within the devolved implementation model. Acceptable outcomes, whether anticipated or unexpected, provided inputs to other internal

[479] For example, APoC may be considered a single generative mechanism (even though the emphasis in this research is to analyse the scheme by breaking it into constituent elements that include separate but interacting generative mechanisms) because it operates through the exercise of causal power that generates visible outcomes.
[480] For example, progress towards the commercialisation of an innovative product or service.
[481] For example, an enterprise that forms part of a group of companies may require parent company approval before proceeding with an application to APoC whereas an enterprise owned and managed by a sole individual can proceed as deemed by the owner-manager.

Table 9 – Background Context, Necessary Conditions, Generative Mechanisms, and Outcomes

Background Context (general)		**Necessary Conditions (external to APoC)**		**Generative Mechanisms (external to APoC)**		**Outcomes (external to APoC)**	
BC01	Belief that innovation drives economic growth, development, and prosperity	NC01	Desire for growth by Government	GM01	Mechanisms to enable successful innovation to boost economic development, growth and prosperity	OT01	Benefits from innovation that accrue to the community
BC02	Regional implementation of UK support policies	NC02	Desire for innovation by Government	GM02	Mechanism to provide a flow of innovative ideas, some meeting APoC approval criteria		
BC03	Conditions imposed when obtaining public sector funding	NC03	Desire for growth among key individuals seeking regional growth and development				
BC04	Private sector criteria for the provision of funding to support proof of concept activity	NC04	Desire for growth among nascent entrepreneurs and innovators				
BC05	Market failure in private sector provision of funding for proof of concept activity	NC05	A continuous flow of innovative ideas				
		NC06	Need to demonstrate proof of concept				
		NC07	Provision of public sector financial support for proof of concept activities				
Background Context (particular influence on APoC)		**Necessary Conditions (internal to APoC)**		**Generative Mechanisms (internal to APoC)**		**Outcomes (internal to APoC and grant holders)**	
BC06	Comparative economic underperformance of the West Midlands region	NC08	Belief that support for proof of concept activity is essential for commercialisation	GM03	Mechanism for regular interaction between senior staff in partner institutions	OT02	Benefits from innovation that accrue to the enterprise
BC07	Desire to boost regional GVA and employment	NC09	Commitment, dedication and motivation of senior staff in regional institutions	GM04	Mechanism for the initial development of APoC including specifying target sectors and criteria for progression of applications	OT03	Publicly financed, risk reduced or risk free proof of concept activity
		NC10	Substantial experience of both private and public sector support for enterprise	GM05	Mechanism for gaining access to public sector finances to fund proof of concept activity	OT04	Amelioration of risk
		NC11	Shared understanding of the need to provide access to public funding for proof of concept activity	GM06	Mechanism for selecting a managing agent by competitive tendering	OT05	Learning
		NC12	Partner institutions parallel experience willing to act collaboratively rather than competitively with within devolved	GM07	Mechanism for developing and operating a devolved distribution model including coordinated, uniform BDA support	OT06	Experience and opportunity

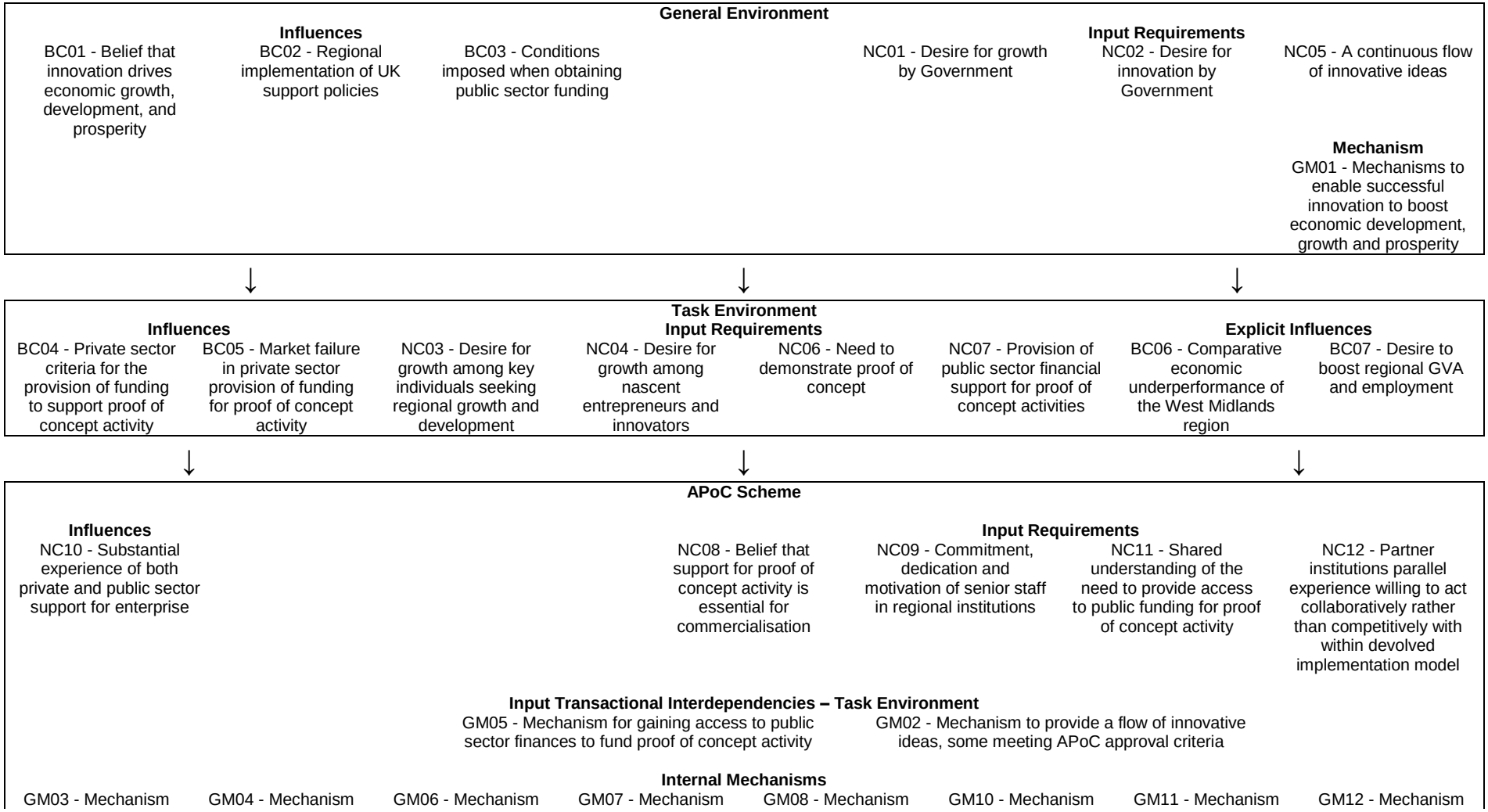
			implementation model				
		NC13	Uniform provision of BDA support throughout region	GM08	Mechanism for developing and operating supporting administrative procedures	OT07	Morale, motivation and drive towards completion
				GM09	Mechanism for marketing the scheme to innovators	OT08	Progression towards commercialisation
				GM10	Mechanism for making grant award decisions		
				GM11	Mechanism for making the grant available through recovery of subcontract costs incurred on qualifying activities		
				GM12	Mechanism to undertake evaluation		
				GM13	Mechanism to provide evidence justifying the use of public resources		
				Generative Mechanisms (within enterprises)			
				GM14	Mechanism for making internal funding available for proof of concept activity		
				GM15	Mechanism for obtaining funding from external private sector providers for proof of concept activity		

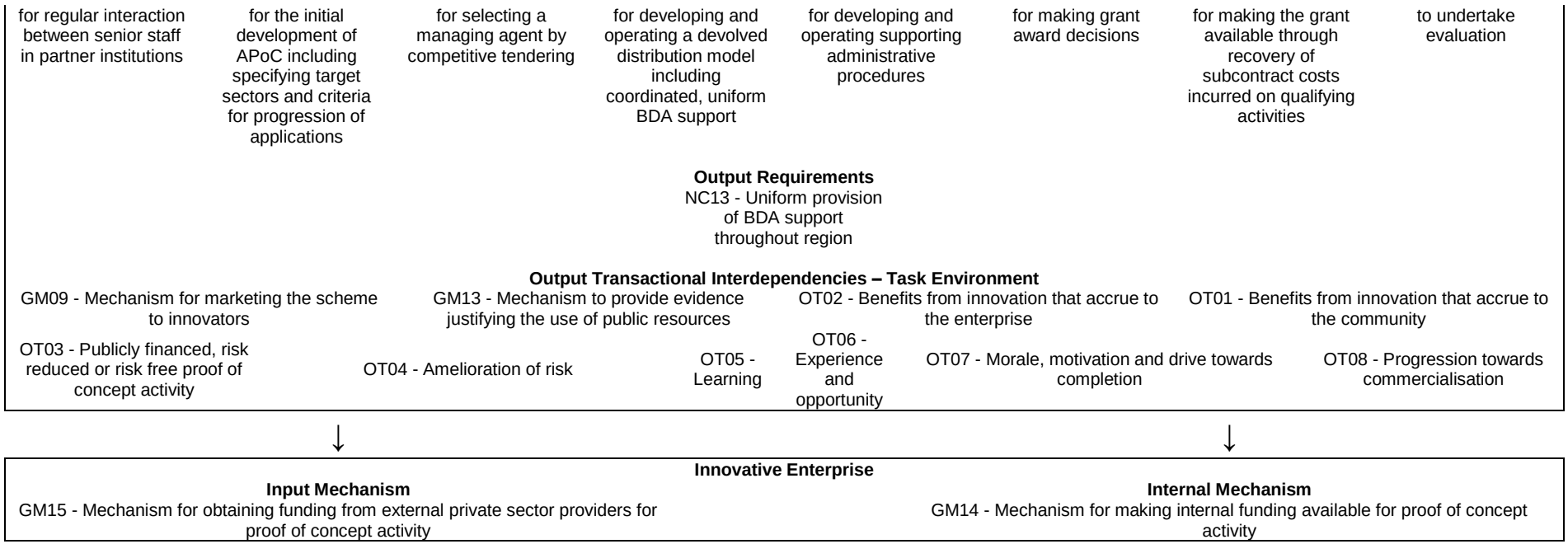
generative mechanisms; for example, the decision to award a grant to an applicant triggered the generative mechanisms for assessing and making payments against expenditure claims for qualifying activities. Outputs that accorded with the applicants contingent circumstances led to benefits for the enterprise, such as the ability to subcontract prototyping, and for the community, such as safeguarding employment. Some outcomes might have had an adverse impact on the community, such as rejection by the award panel delaying an innovative project.

Table 9 illustrates selected examples of the real, perceived background context, necessary conditions, and principal generative mechanisms that influenced the actual creation, development, operation, and closure of APoC, and the consequences and outcomes arising. The elements highlighted were selected intuitively as apparently accurate descriptions of causal influences. For the sake of clarity the researcher deliberately reduced and simplified the number of items identified in each category, principally by conflating the constituent elements of specific items and grouping them under a single descriptor, but only where it was considered unlikely that the resultant loss of detail would not detrimentally impact on developing explanation.

Figure 20 expands the perspective to indicate the plausible generative mechanisms that may have enabled APoC to operate. The figure draws upon Emery and Trist (1965) and Hall (1972) to portray APoC as a focal organisational entity located within a sphere of influence created by general and task, or specific, environmental factors. The environment and the focal organisation were connected through a series of mechanisms, also known as linkages, which explained input and output transactional interdependencies. Transactional interdependencies span the boundary of APoC (focal organisation) and serve the purpose of engaging in exchange processes, sometimes receiving information, services, and finances from the environment

Figure 20 – Mechanisms and Relationships



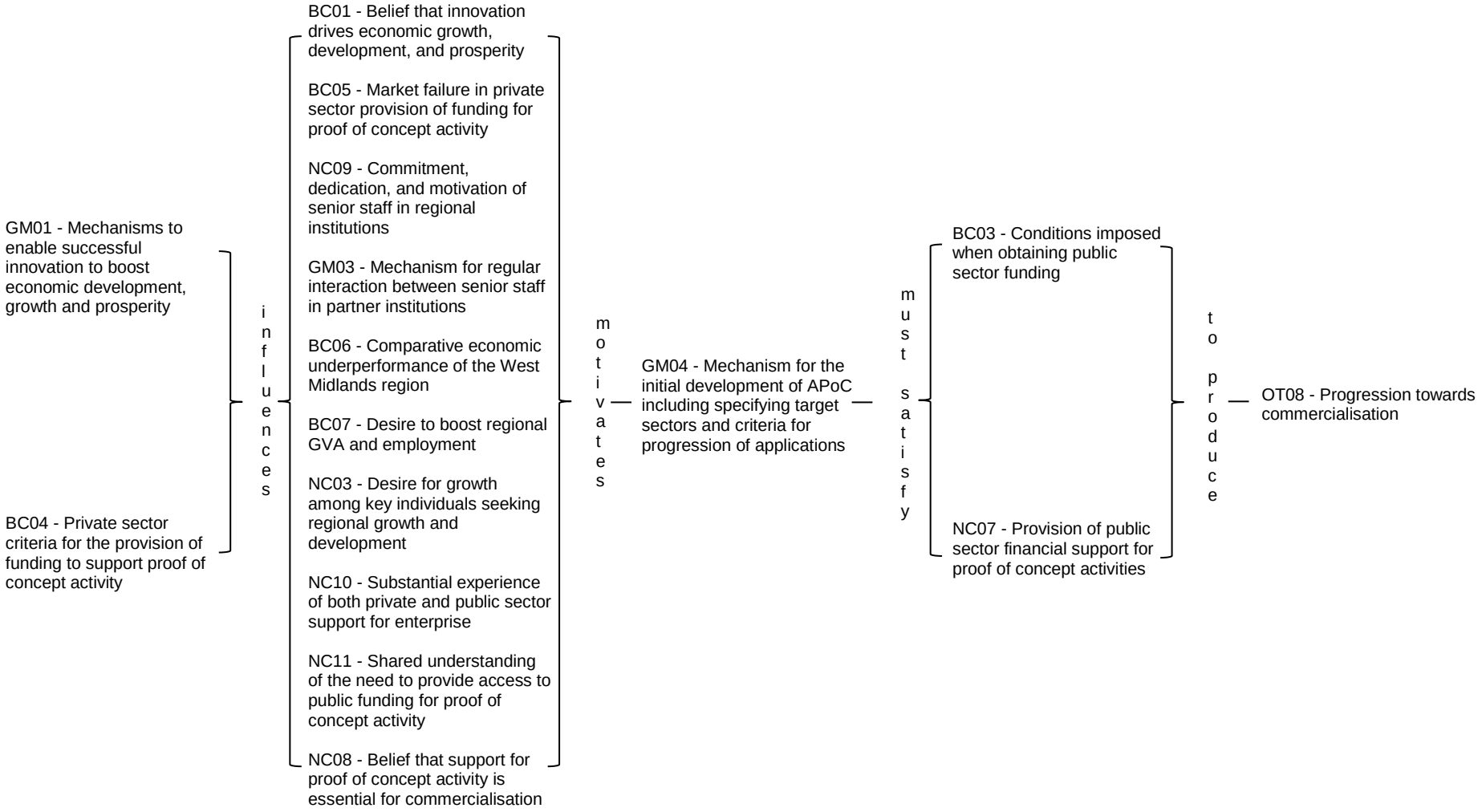

for regular interaction between senior staff in partner institutions
for the initial development of APoC including specifying target sectors and criteria for progression of applications
for selecting a managing agent by competitive tendering
for developing and operating a devolved distribution model including coordinated, uniform BDA support
for developing and operating supporting administrative procedures
for making grant award decisions
for making the grant available through recovery of subcontract costs incurred on qualifying activities
to undertake evaluation
Output Requirements
NC13 - Uniform provision of BDA support throughout region
Output Transactional Interdependencies – Task Environment
GM09 - Mechanism for marketing the scheme to innovators
GM13 - Mechanism to provide evidence justifying the use of public resources
OT02 - Benefits from innovation that accrue to the enterprise
OT01 - Benefits from innovation that accrue to the community
OT03 - Publicly financed, risk reduced or risk free proof of concept activity
OT04 - Amelioration of risk
OT05 - Learning
OT06 - Experience and opportunity
OT07 - Morale, motivation and drive towards completion
OT08 - Progression towards commercialisation
Innovative Enterprise
Input Mechanism
GM15 - Mechanism for obtaining funding from external private sector providers for proof of concept activity
Internal Mechanism
GM14 - Mechanism for making internal funding available for proof of concept activity

which were exchanged within the scheme for information, services, and finance which were conveyed into the environment, often to a specific recipient. Input transactional interdependencies affected mechanisms operating wholly within the focal organisation, while other internal mechanisms operating wholly within the organisation (scheme) produced outputs which were conveyed across the boundary to affect aspects of the task or specific environment. These were then known as 'output transactional dependencies' and arose from interactions taking place within the scheme, with internal linkages creating outputs which were transferred across the boundary. The theme of being able to imagine APoC operating and producing alternative outputs because of different decisions made internally, remains.

Internal mechanisms are entirely mutually supportive; the output from one internal mechanism often forming the input to another, but are not wholly independent, either individually or collectively. They do not span the boundary of the scheme nor have direct relationships with any external, environmental factor or influence, but they are dependent upon internal relationships within APoC to both influence and be influenced indirectly by external environmental factors.

Issues identified as background context were regarded as part of either the general or the task environment for APoC. Similarly, necessary conditions were considered as either elements of the general environment or elements of the task environment; differentiated by the extent to which a factor had general significance in the context of supporting innovation, compared to specific significance for APoC. It was likely that all elements of the task environment had parallel elements specifically influencing other support interventions for proof of concept activity in other regions, but this was not explored in this research. Elements of the general environment probably had influence beyond support interventions for proof of concept. For example, generative

Figure 21 - Phase One: Pre-APoC and the Advent of the Scheme



mechanism 01 – GM01, categorised within the general environment, must be present in any context that is underpinned by a belief that innovation was a driver of economic development, growth, and prosperity.

5.4.2.2.2 – Explaining the Development of APoC

During phase one, pre-APoC, and the advent of the scheme, most background context, many necessary conditions, and some generative mechanisms must have existed because they influenced general support for innovation in the region. Figure 21 illustrates relationships between elements of background context that were particularly influential immediately prior to, and during, the development of APoC. The scheme designers sought to address specific obstacles in the background context by creating a support activity that better met necessary conditions for commercialisation. The scheme overcame perceived obstacles, linked into then existing generative mechanisms, and provided enhanced outcomes compared to those already being created by the support available prior to APoC. It drew upon pre-existing elements of support services for innovation, but triggered new generative mechanisms by forming new relationships between pre-existing elements, changing some pre-existing elements, and establishing new conditions that facilitated progress towards commercialisation.

Prior to APoC enterprises must have been able to overcome the dearth of public sector financing at critical points during the process (Background Context 03 - BC03), including early-stage proof of concept that subsequently became the focus of the scheme. Hence, enterprises must have already developed mechanisms to secure funding from either internal sources (Generative Mechanism 14 - GM14), or private sector providers (GM15), notwithstanding BC04 – the criteria imposed by private sector providers, since these constituted the principal (possibly only) source of funding for proof of concept activity prior to APoC. The absence of such

mechanisms did not necessarily negate demand for proof of concept activity, but implies that either alternative sources of finance existed, or that innovation occurred without demonstrating proof of concept. This infers that commercialisation took place in an environment of greater perceived risk and without satisfactory confirmation of commercial potential.

The structural conditions prior to APoC included elements of background context and generative mechanisms that, whilst not being solely relevant to the scheme, remained important influences throughout its life. Innovation was typically perceived as an important contributor to achieving economic growth and to modernising an economy based upon traditional industries (BC01). The drive to foster innovation was predicated on the belief that mechanisms exist to enable the outcomes arising from successful innovation to boost economic growth, development, and prosperity (GM01). For example, both prior to APoC and during operations, an underlying generative mechanism (labelled GM01 in Table 9 and Figure 21) must have been operating to enable this to occur. The mechanism must have been present and producing observable outcomes to substantiate belief in innovation does contribute to economic development, growth, and prosperity. The belief established a number of conditions for intervention to facilitate, foster, or otherwise support innovation. Although pre-dating APoC, in the context of the development of the scheme these became necessary conditions that needed to be satisfied and contributed to the rationale for designing and developing the scheme.

Scheme Management interviews inferred that the emergence of APoC was driven by commitment, dedication and motivation, exhibited during regular interaction (GM03), by a small number of senior staff (Necessary Condition - NC09). Comparative analysis has shown that the economic performance of the West Midlands region and levels of innovation were not comparable to equivalent regions across the UK

(BC06). This suggested that obstacles suppressing innovation and economic performance were not having such a marked impact in other equivalent regions. APoC would not have been developed without the strong support of certain 'powerful particulars' (NC03). Collectively, there was substantial experience of both public and private sector support for enterprise in the region (NC10). Over time and through regular interaction (GM03), a shared understanding of the principal challenges emerged (NC11). Similarly, regular interaction led to the articulation of an agreed desire to boost gross value added (GVA) and employment (BC07). No dissenting voices were identified: shared understanding contributed to a very strong bond between partners.

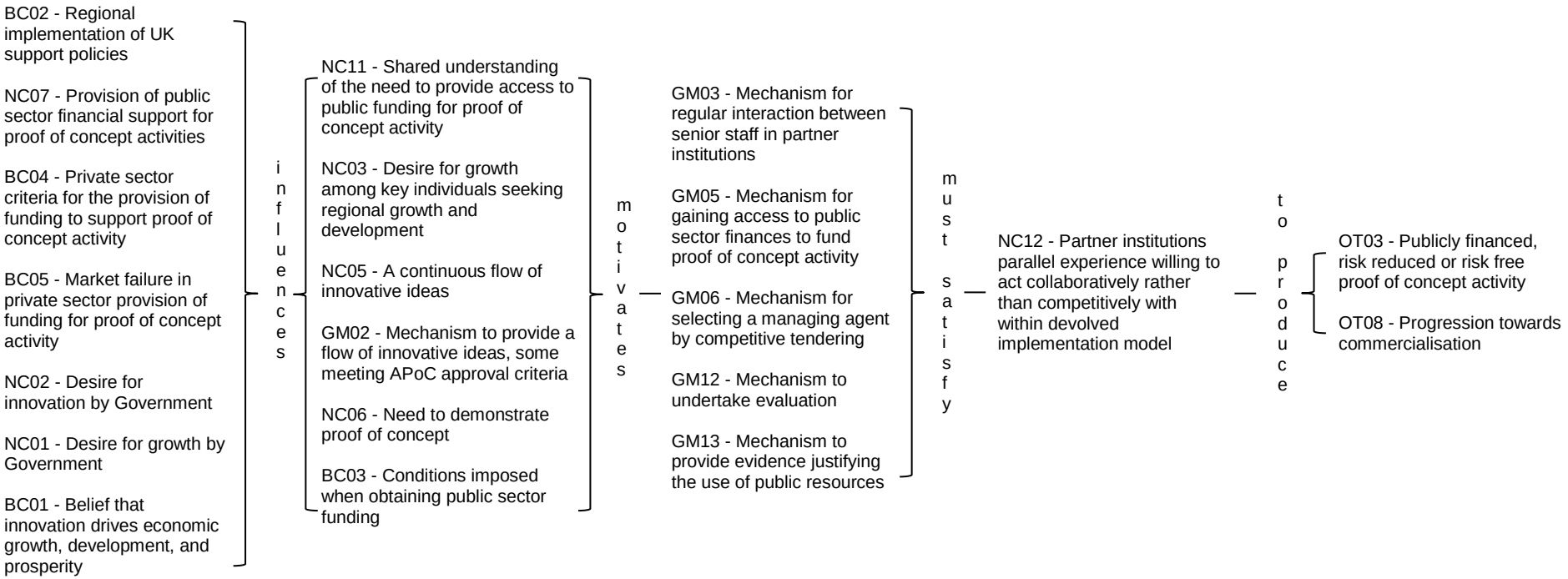
The collective experience of the group (NC10) was essential to realising that the absence of both private (BC04) and public (NC07) sector financial support for proof of concept activities had a consequent detrimental impact on the progression of new ideas towards commercialisation (Outcome - OT08). APoC was conceived as a mechanism to fill this finance gap, with the aim of fostering commercialisation (NC08) and to facilitate enabling enterprises to progress towards anticipated positive impacts on GVA and employment (BC07). This was probably the trigger point that initiated the process of developing APoC (GM04). Hence, the development, and eventual implementation of APoC appears to have pivoted on region-wide agreement (NC11) that support for proof of concept activity was an essential element of fostering commercialisation (NC08); that there was no specific public sector support for proof of concept activity (NC07); and that there was market failure in private sector support (BC05).

Figure 22 illustrates three particularly important influences existing immediately prior to APoC, phase two, the development of operational procedures. These are: regional implementation of UK support policies (BC02); absence of provision of public sector financial support for proof of concept activities (NC07); and private sector criteria for the provision of funding to support proof of concept activity (BC04). Counterfactual thinking asked whether APoC could have come into existence had any of those elements been different or, possibly, not existed at all? Equally, might differences in those elements have led to APoC taking a different form?

BC02 reflects the regional basis of local agencies implementing UK Government policy. This provided the mechanism for regular, routine interaction between support institutions (GM03) which either had responsibility for specific aspects of implementation, participated in interfacing with enterprises that benefited from regional policies, or provided particular support skills, often tied to specific industry sectors.

The absence of public sector financial support for proof of concept activity, when considered alongside the private sector criteria for providing funding for support activity (BC04), was almost certainly a necessary condition (NC07). Fundamentally, this gave scheme designers the ammunition to argue that market failure had occurred (BC05). Addressing market failure was a consistent and strong rationale to justify intervention using public resources (GLA Economics, 2008). Unless it was possible to gain access to public sector financing (GM05) to fill gaps arising from the failure of the private sector to fund proof of concept activity (BC05) then policy to support innovation would be undermined and, at best, APoC became simply another source of funds equivalent to the private sector from whom it would have to be

Figure 22 - Phase Two: Development of Operational Procedures



funded. Government intervention in a different form[482] was necessary to facilitate private sector suppliers meeting the need for funding proof of concept activity (BC04).

Shared understanding contributed significantly to developing a mechanism which overcame the perceived barrier to obtaining public finance (NC11). Prior experience was probably advantageous in developing and exploiting a mechanism that draws upon public sector finance (GM05) as a means to provide financial support for enterprises with innovative ideas. Success enabled funding to be made available to qualifying enterprises, without the need to guarantee some form of financial return.

Almost certainly, the desire for innovation by Government (NC02) and a shared understanding of the need to provide access to public sector funding (NC11) in the absence of existing public sector provision (NC07) were necessary conditions for APoC. For the key individuals seeking regional growth and development (NC03) and Government (NC01), their interest was almost certainly grounded in an unquestioned belief that innovation drives economic growth, development and prosperity (BC01) (Hobcraft, 2013).

A continuing flow of innovative ideas (NC05), combined with a mechanism to deliver ideas that meet approval criteria (GM02), was another necessary condition since, in the absence of inventors seeking to commercialise their ideas and research outcomes, there is no basis for providing support for proof of concept activity. The need to demonstrate proof of concept (NC06) was also an enduring necessary condition for APoC, with the need likely to remain irrespective of whether or not the scheme exists.

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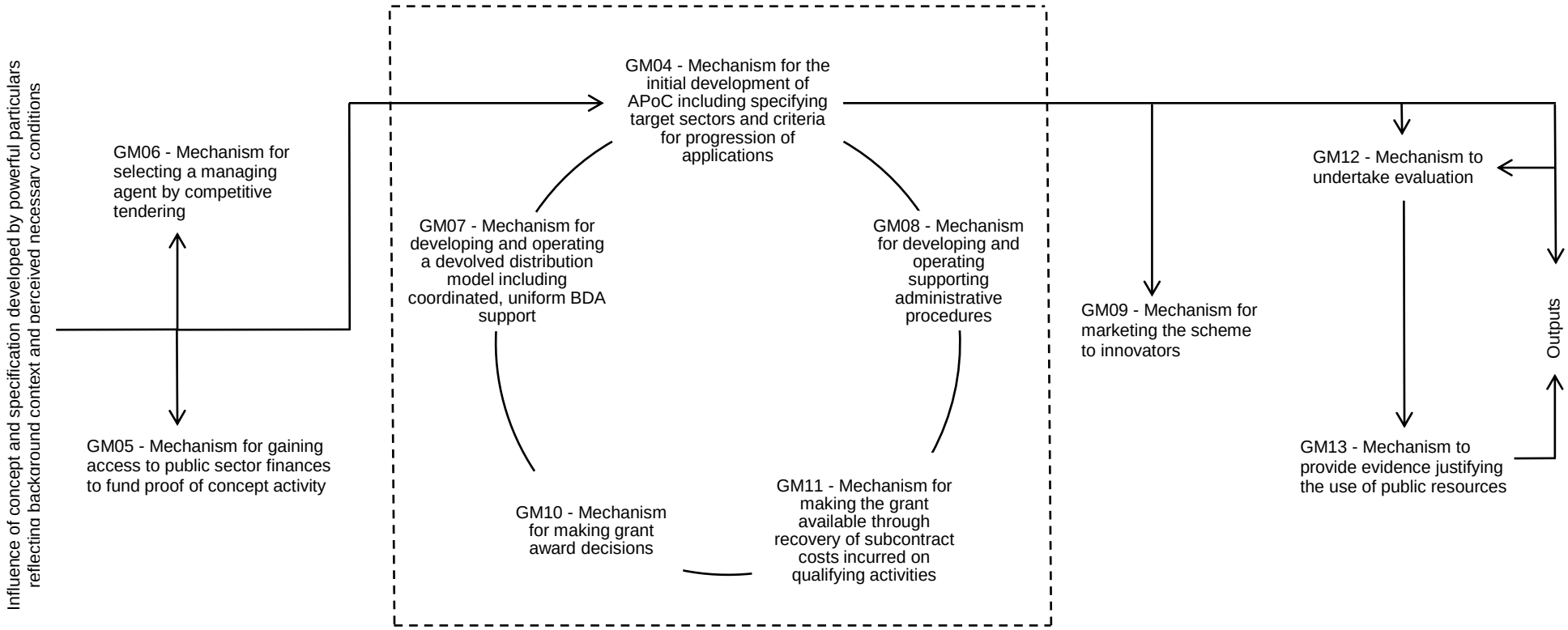
[482] An example of contradictory logic counterfactual argumentation

Public sector funding imposes certain conditions upon users (BC03) and later requires that mechanisms are developed to provide evidence to justify expenditure (GM13). This led to a requirement to carry out a traditional evaluation (GM12) in accordance with HM Treasury requirements. Finance was also obtained from ERDF who, separately, imposed conditions for eligibility criteria. Procedures developed within APoC (GM08) shielded applicants from the extremely detailed operational requirements imposed by ERDF. From the perspective of the applicant it appeared that APoC funding was provided from a single source. The scheme would have taken a fundamentally different form had any other source of finance been required, although a very similar scheme to APoC, relying upon private sector funding, could have been developed. It seems certain that doing so would have needed a mechanism to make an acceptable return to the fund providers (BC04 and OT01).

The third phase, implementing and operating the scheme, was concerned triggering some of the generative mechanisms identified earlier. Figure 23 illustrates relationships between those generative mechanisms and the outcomes produced. Implementation springs from the interplay between three particular influences. Firstly, background context and necessary conditions that determined the parameters for the initial concept of APoC. Secondly, the initial concept itself, including further necessary conditions which powerful particulars expected to be satisfied. Thirdly, the detailed specification drawn up for selecting a Managing Agent; interpretation of these influences, their relative power, and suitability are arguably the most significant determinants of the operating characteristics of the scheme.

AWM initiated implementation by drawing upon their existing mechanisms to secure public sector funding to support the APoC project (GM05). Securing public funding

Figure 23 - Phase Three: Implementing and Operating the Scheme



Core Internal Mechanisms Driving the Scheme

(GM05) was an input transactional interdependency. The output from the mechanism provided APoC with its major input resource. It is a mechanism that pre-dated APoC, which is evidenced by AWM's prior experience of using public resources to fund support activity, including previous interventions with the Managing Agent and many of the partner institutions that became part of the APoC project.

The mechanism, relationships, and procedures to secure public funding operated in exactly the same way that any other design for support for proof of concept activity, or any other scheme that used public resources to support enterprises, would have been able to follow. Whilst there are nuances that reflect the precise purpose and form of APoC, this amounts only to the flexibility needed in any mechanism intended to have broad applicability.

Either simultaneously, or probably slightly lagging behind, being certain of securing public funding, the Managing Agent was appointed following a competitive tendering process (GM06). The RDA followed conventional practice and issued a competitive tender for bids to finalise and operate the scheme. The tender document was influential in directing bidders towards meeting necessary conditions, but did not constrain the mode of operation to be adopted. Although one partner was selected to fulfil the role of managing agent, no single institution/partner acting independently had the infrastructure and resources required to offer a uniform service across the entire region. APoC could not have operated in the form that it did without drawing upon local providers and prior experience of working collaboratively on previous support service initiatives (NC12) which laid the foundation of an effective support network.

The Managing Agent took control of implementation and developed several internal mechanisms to operate APoC successfully. For example, specifying target sectors

(GM04) was typical of most transactional interdependencies that arose initially within APoC, being the outcome of a decision to try and attract those enterprises with innovative ideas which appear to offer the best opportunities to bring economic growth, development, and prosperity to the region. The decision was influenced by the requirements specified in the tender document, including the precise specification of each sector to be targeted[483]. The outcome from the mechanism was experienced in the task environment as an element of the output transactional dependency marketing APoC (GM09).

Additionally, the Managing Agent defined criteria to be satisfied at each stage of the application process, from initial receipt of enquiry to grant payments (GM04). Some criteria probably reflected critical statements in the tender document and were essential elements of the underlying concept for the scheme. Other criteria were defined by the Managing Agent and were accepted by the decision-makers when awarding the contract.

The Managing Agent developed a devolved distribution mechanism (GM07) that required collaborative behaviour from partner institutions who were able market the scheme and provide support to applicants in their local area (NC12). Integral to the devolved model was the coordinated provision of uniform BDA support for applicants across the region (NC13). This was essential in satisfying the requirement for equal opportunity to access the scheme from anywhere within the region.

The Managing Agent also designed and implemented administrative procedures (GM08) to monitor and control routine tasks, such as recording basic descriptive data about applicants and their progression through the application process. The

[483] The exact wording of the tender document is unknown.

administrative procedures drew on the central database that was accessible by any partner in the distribution network. This led to some inconsistencies in data recording (covered in sub-section 3.4.1).

The process for making grant decisions (GM10) served a number of purposes. By choosing to use a panel of external experts, the Managing Agent demonstrated equity and fairness, with no undue influence from those providing funds. However, the applicant and the panel never met because the application was presented by the BDA who had worked with the applicant. The rationale was to ensure that applications were presented uniformly and that the decision to award a grant was based upon the strength of the innovative idea being proposed. The panel made a recommendation to the Managing Agent, who was not bound, contractually, to accept it. However, none were ever rejected and this was, in effect, the award decision point.

Interaction between applicants and BDAs made possible the provision of consistent support (NC13). BDAs were the 'street-level bureaucrats' (Mole 2002, p.182) of APoC, providing discretionary interpretation of ambiguities in scheme policy and resolving tensions between multiple objectives when delivering support. APoC policy aspired to uniformity, which implies control over the actions of BDAs, but discretionary interpretation suggests a more enabling approach. Consequently, interactions between applicants and BDAs were considered examples of non-routine social interaction. Without APoC, it was unlikely that the specific interactions observed would occur, although other forms of routine interaction probably would have continued, normally taking place in a non-routine context. For example, an

applicant was required to interact with a BDA (non-routine social interaction) in the process of developing their application (NC13 and GM10)[484].

A separate process was developed to make provision for the grants awarded to be made available to successful applicants (GM11). Whilst there was a framework that guided all grants, with standard terms and conditions covering the majority of administrative and legal issues, each applicant received an individual grant offer subject to any terms and conditions that reflected their particular circumstances. From the perspective of the grant holder enterprises, one of the principal output transactional interdependencies arose from the procedures developed by the Managing Agent to enable recovery of approved costs (GM11). This required expenditure incurred to be evidenced by documentary proof of payment submitted to the scheme administrator. Providing the expenditure covered qualifying costs, reimbursement was arranged.

Output transactional interdependencies included the mechanism for marketing APoC (GM09), which comprised two principal forms. Initially, marketing was centralised to ensure consistency in projecting a uniform image across the region. Some local variation was permitted, with local partners seeking to attract applicants during periods when the flow of applications began to lessen. In practice, however, launch of the scheme was delayed but local partners had been quietly promoting APoC in the preceding weeks and this created an initial 'bubble' of demand. Overall, the outcome from marketing activity formed the input to a mechanism that provided a

[484] Applicant and BDA were expected to observe the conventions of a supportive formal relationship that maintains social cohesion. Having been brought together by a formal structural requirement of the scheme, it is highly likely that routine social interaction of the type typically experienced by colleagues, who work together, would also occur. Both parties entered into the formal relationship with expectations of maintaining an accord based upon normal social conventions. Every day conversations arose, sharing experiences of family members or casual social activities. Lunch breaks were taken together and so on. Each party would have expected to show normal respect for the other(s) as in a typical social relationship between human beings, exhibiting conventional manners, and standards of etiquette that maintains pleasant and relaxed interaction to ease the formal elements of the relationship.

consistent flow of eligible applicants with proposals of an appropriate quality to satisfy pre-determined eligibility criteria (GM02 and NC05).

The terms and conditions covering all grants included a requirement that successful applicants supplied data on request to enable performance evaluation. The procedures (GM12) conformed precisely to standard quantitative evaluation models, relying heavily upon gathering data concerning pre-determined key performance indicators. There was no substantive opportunity for grant holders to contribute qualitative data concerning performance or evidence of outcomes that lay outside the scope of the pre-determined key performance indicators. The data collected, albeit extremely limited, was analysed as part of the performance review reported in Section 4.0 – APoC Scheme. The outcome from evaluation formed an input into a mechanism that enabled the Managing Agent to provide evidence justifying the use of public resources in operating APoC (GM13).

APoC comprised an overall framework that sought to regulate behaviour and interaction, but which was applied more as a loose guide than a rigid template. Although partners acted collaboratively in supporting APoC applicants, many used APoC to offer additional support services. Some stepped outside APoC to access the informal regional network of support service providers who were able to help the applicants for whom they were responsible.

Identifying generative mechanisms individually created the impression that each mechanism operated as a distinct, independent entity. However, the observed outputs arose principally through the interrelationships between mechanisms. Each mechanism was triggered in response to influences in the background context and structural conditioning that presented necessary conditions. To operate successfully each generative mechanism drew on inputs, which often took the form of outputs

from other generative mechanisms. In turn, the outputs created formed inputs for other generative mechanisms and a chain of influences was created by the relationships linking successive generative mechanisms.

Scheme outcomes were classified into three related groups. Firstly, the most general outcomes encompassing benefits arising from innovation activity that accrue to the community and the enterprise[485], including outcomes that were considered the *raison d'étre* justifying the development of the scheme. APoC acted as a facilitator that assisted innovative enterprises engaging in chains of activity, or mechanisms, that ultimately produced the benefits cited. Grants acted as a lubricant to smooth the operation of mechanisms[486]. Identical mechanisms must have pre-dated APoC, fuelling the belief in innovative activity benefitting both enterprise and community, and there is no evidence to suggest that the scheme created new activities that had not existed prior to the grants becoming available. However, there is evidence that some enterprises were able to access certain mechanisms, or to modify elements of other mechanisms, as a consequence of grants being available to customise operations to meet their contingent circumstances. For example, enterprise E09 confirmed that they were only able to make a successful patent application (accessing the pre-existing patenting mechanism) because they were awarded an APoC grant.

In this explanation of APoC GM01 enabled the outcomes from successful innovation to be communicated as observable benefits accruing to the enterprise (OT02) and to the community (OT01). Stakeholders of both the enterprise and the community were

[485] Given that the focus of this research is the APoC scheme, the discussion that follows and the vocabulary used may create the impression that these benefits can be derived only through the scheme. However, this is NOT the case; there are many different ways in which these benefits can be achieved.
[486] It is likely that chains of activity existed in generic form and were 'customised' to take into consideration the contextual consequences of each operational occurrence. For example, many applicants report being able to develop prototypes using their grant, but the actions required and the prototype developed varies for each grant holder.

able to use the accrued benefits to engage in activities with other enterprises and thereby contribute to economic development, growth, and prosperity. For example, enterprise E10, which gained benefits from successful innovation supported by APoC, was able to purchase supplies and raw materials locally, as well as from outside the region, thus contributing to the multiplier effect. For E26, which was part of a group of companies, the parent company was able to use earnings from successful innovation supported by APoC to reinvest in a continuing flow of innovations increasing activity in the local economy.

The second group of outcomes comprised a single issue – a publicly financed, risk reduced or risk free proof of concept activity (OT03) - satisfying the need created by the absence of public sector funding, combined with market failure in private sector provision, for funding proof of concept activity in qualifying enterprises. One of the most striking features of APoC is the sheer volume of interrelationships that arose from the operation of the generative mechanisms that were essential to facilitating the operation of the scheme. Were any one of those interrelationships to cease, or break down or be counteracted by a countervailing tendency produced by another generative mechanism (probably not recognised in this analysis), then APoC would have either failed or taken a fundamentally different form. However, when all the interrelationships function, the generative mechanisms create a publicly financed scheme that is risk free, or reduces risk for grant holders who use the grant to engage in proof of concept activity.

The third tier comprises many different, specific forms of outcome that benefitted innovative enterprises. The outcomes embraced both tangible and intangible elements, interconnected in complex and dynamic relationships, triggering mechanisms and activities that benefitted the enterprise and the community. As indicated in Section 4.0 – APoC Scheme, conventional evaluation identified a

number of tangible outcomes associated with the performance of the partner institutions, the BDAs appointed to support applicants, and enterprises' use of the grants awarded. It was not possible to identify precisely which elements of the scheme led to any specific observed outcome and it seems highly likely that every element played some role in producing every outcome, although, clearly, the relative importance of each element varies from case to case. For example, the successful use of a grant is crucially dependent upon the capabilities of the recipient, which, in turn, constrains the potential for creating added value and influenced the extent to which supplementary support services were provided in parallel with the grant.

However, of most interest in this research are the outcomes that were achieved but not identified during conventional evaluation. Again, it is not possible to determine precisely which elements of the scheme led to any of these 'additional' outcomes, but it is highly likely that these outcomes arose from the interrelationships between the generative mechanisms driving the scheme (Figure 23). Hence, the 'additional' outcomes arose *inter alia* the creation of outcomes that were detected by conventional evaluation. This is the crux of this research – the need to establish why conventional evaluation did not detect all outcomes and whether applying critical realist metatheory provided access to fuller knowledge and understanding of the mechanisms driving those outcomes.

This research highlighted four 'additional' outcomes recognised by interviewees. Firstly, the award of the grant ameliorated risk for the grant holder (OT04). This had several knock-on effects, but notably facilitating the decision to proceed with the innovative project in circumstances where it was possible that no further action would be taken in the absence of the grant. Additionally, reduced risk had a 'signalling' effect, helping both the project and the enterprise become more visible and attractive to external investors. Undoubtedly this outcome had an impact upon leveraging

further public sector resources over and above the APoC grant and attracting additional private sector investment that was reported, but not explained, during conventional evaluation. The status of the enterprise was also enhanced if and when the grant enabled progression towards commercialisation, especially if this included successful demonstration of proof of concept.

Secondly, the entire process of becoming involved with APoC provided a learning experience for every applicant (OT05), irrespective of whether a grant was awarded. The learning achieved varied from context to context and ranged from business-orientated practices and procedures to specific technical expertise. Unfortunately, learning was not inexorably linked with progress towards commercialisation and sometimes led to recognition that the proposal did not have the anticipated commercial viability. Similarly, sometimes technical learning accrued which was not taken forward towards commercialisation on this occasion but might be carried over to a future project. It is likely that learning was partially responsible for the number of newly written business plans that were reported during conventional evaluation.

Thirdly, APoC provided the opportunity for anyone within the region to explore innovative ideas and, where it proved possible to progress an enquiry into an application, the scheme provided experience in applying for public sector support (OT06). Successful applicants then also gained experience in progressing towards commercialisation and possibly implementing a plan to launch a new product onto the market. Again, conventional evaluation reported that new businesses were created, although insufficient detail was given of the definitions used in recording the data to clarify if the figures given reflect completely new businesses, or include new business units within existing enterprises.

Fourthly, participation in APoC boosted morale, motivation and drive amongst applicants to be fully committed to the successful completion of their project (OT07). The effect on morale was driven by the interpretation that someone external to the project, regarded as a knowledgeable individual, informally endorsed the proposal. This boosted confidence and self-esteem for the applicant. Interestingly, irrespective of whether the application was successful, motivation increased. Successful applicants received a boost from gaining access to additional resources and access to the support services provided alongside the grant, which increased commitment to complete the project. Unsuccessful applicants, whilst initially disappointed, were motivated to re-double their efforts to progress with their project without APoC, drawing upon other sources of resource, if only to prove that their faith was justified. There were obvious successes (E10, E33), but sadly, there were also some projects that did not produce the outcomes expected (E23). The variation in outcome illustrates the dynamics of operating in an open system where changing relationships between generative mechanisms and contextual influences can accentuate or depress outcomes.

Lastly, the final outcome arising from the scheme - progression towards commercialisation (OT08) - captures the essential purpose of APoC and results from a combination of tangible and intangible outcomes, whether detected during conventional evaluation or identifiable when conducting analysis within critical realist metatheory. Conventional evaluation was not able to illuminate explanatory influences and did not heighten understanding in the way that critical realist metatheory was able to achieve.

During operation developments occurred which altered background context and triggered phase four, termination of the Scheme and beyond. A change of Government meant revised support policy, adjusting the structural conditions that

materially affected APoC, especially by removing some of the necessary conditions. Specifically, the loss of local policy implementation through Regional Development Agencies took away direct access to public resources. It is possible to imagine APoC operating with alternative sources of funding, but the necessary conditions did not arise to enable the funds needed to be attracted from an alternative source. There was no available alternative but to close APoC. However, the mechanisms remained in place and had it proven possible to provide alternative funding, APoC could have endured.

In the absence of alternative funding, the contingent circumstances arising from APoC also changed, with the loss of some direct outcomes and the gradual fading in effectiveness of others. Scheme Management were required to specify a cut-off point after which no further applications could be processed and a later point after which no further claims for cost recovery could be submitted. Positive outcomes, such as the learning achieved in terms of business process activity and submitting grant applications, continued and still continue to evolve. Two outcomes in particular were identifiable. Firstly, the continuing levels of activity in specific enterprises – for example, cursory observation suggests a marked increase in the number of products produced by E26 visible in everyday use in society. Secondly, some successful applicants who have been able to develop their project as a result of APoC are now better prepared to seek private sector support – for example, E29.

Although progress is evident in some aspects post-APoC the structural conditions mirror the pre-APoC situation. Firms seeking funding for proof of concept activity post-APoC are again dependent on including proof of concept in applications to seek other non-specific forms of public sector support, using private sector sources, or internal funding.

5.4.2.3 – Individual Enterprises

Further deepening, and broadening, understanding and explanation of APoC can be achieved by exploring the scheme at the level of abstraction of individual enterprises. The previous two models and explanations, based on alternative abstractions, remain valid and establish the context within which individual enterprises / enquirers / applicants engaged with the scheme. Although precise data is not available, most applicants already interfaced with a support service provider who was able to advocate APoC. Hence, whilst non-routine social interaction was the foundation for APoC taking the form it did, routine social interaction drew in applicants and ensured that the scheme operated as it did.

In other circumstances, Scheme Management interviewees might have perceived themselves to be in competition with one another. This might have led to enquirers being recommended to pursue an alternative form of support which specifically benefitted their contact, for example, a particular intervention developed by one support institution that was not made available through others, but social cohesion was maintained through recognition of the benefits of collaborative behaviour that could be shared in the region. With respect to APoC, applicants were not in competition with one another; all could gain a grant by meeting the specified criteria. This also helped reduce tension between partners. Nevertheless, mutual respect was a necessary condition; no party could assume a superior position.

In this research, Enterprises E04, E10, E15, E17, E25, E29 and E30 all claim to have been dependent upon APoC. However, the degree of dependence varied. E04 was an experienced, individual business person who had already completed a great deal of research activity and technical development, but claimed to have needed APoC to provide sufficient funding to finalise the project. It seems likely that, whilst an unsuccessful application to APoC may have been a set-back, it would merely delay,

not prevent, completion. E10, E15, and E17 were all putting forward proposals that were supplementary to core activity in the enterprise. It may be the case that internal support was not available for the project, but an unsuccessful APoC application was unlikely to lead to the demise of the enterprise. Instead, management might have needed to re-assess their priorities for the project to continue. The way in which BDAs approached these applicants raises the question whether the scheme was purposefully designed to support existing enterprises to be innovative (more innovative?) or was APoC really intended to lead to the creation of new enterprises?

E25 and E30 were both individuals; one seeking to commercialise a novel application of existing technology, the other the inventor of a completely new piece of equipment. It was immediately clear that dependence on APoC was almost total. Pursuing their innovative idea was perceived as integral to their identity and, consequently, their behaviour would not change irrespective of the outcome of their application to APoC. Winning a grant would be effective in contributing to smoothing progress, perhaps even overcoming barriers, but fundamentally the project would go ahead with or without a grant. Neither had any visible alternative source of funding and were heavily dependent upon family support. Both were clearly intensely interested in the progress of their application and sought to develop close relationships with their respective BDAs and supplementary support services, because this was perceived as a mechanism for speeding up progress towards commercialisation.

Arguably, the most interesting case is E29. They had developed a sophisticated application with enormous potential, but needed to demonstrate commercial viability at a scale of both production and application that would be of interest to major funding providers. However, their personal circumstances limited opportunities and clearly, APoC was essential to any further progress, even though their needs were actually far greater than APoC could ever provide. Nonetheless, the intensity of their

dependence upon APoC was palpable and the sense of appreciation for receiving a grant, even though it would provide only limited further progress, was tangible. Yet, the absence of any follow-on support after receiving the grant, or further funding opportunities after the grant had finished, returned the applicant to their starting position, but better equipped to source non-APoC resources.

Each application was a dynamic process and changed circumstances for the applicant. Given the level of support provided by BDAs, under normal conditions, every presentation would result in the award of a grant. However, this was not always the case; Enterprises E05 and E08 both experienced rejection at the decision-making panel stage and expressed significant disappointment. Characteristically, both sought to justify rejection by suggesting that the BDA did not give a fair representation of their proposal. There is no evidence to suggest that social interaction with the BDA had been less than satisfactory in the build-up to presentation. Indeed, both applicants had prior experience of bidding successfully for grants in other contexts; if they had had doubts, they should have intervened – very easy to say, in hindsight. Post-APoC, both expressed doubts about not permitting applicants to deliver their own presentation. However, both were able to quickly engage contingency plans and neither project suffered more than minor delay, although some loss of pride was apparent, even though learning from their experience was achieved. For example, both realised the significance of personal exposure in situations of trust.

A further example concerned E19. In this instance a grant was awarded and initially there were indications that it would be taken up. However, after some delay and despite external support and validation of the project concept, the relationship between business partners broke down and the project did not proceed. No grant monies were drawn down and the funding was returned to the Managing Agent. This

illustrates that even when social interaction within APoC is proceeding normally external countervailing forces can interrupt the smooth flow of the scheme. It also demonstrated that conditions within the scheme and social relationships outside it are important for effective operation.

Continuing to explore APoC at the applicant level of abstraction also allowed comparative analysis to support retroductive inference. The underlying assumption was that all the cases selected experienced identical manifestation of the same structure and processes, but differed in other respects. APoC was designed to create a framework of policies and procedures that would be applied uniformly and consistently to all applicants. Policies and procedures are necessary conditions for each application. Differences, which correspond to contingent conditions, do arise in the specific circumstances influenced by characteristics of applicants prior to or at application. Differences in outcome, contingent circumstances, arose because the framework, although thought to be applied uniformly in normal operating conditions, was subject to influence by BDAs' actions as 'street-level bureaucrats' (sub-section 5.4.2.2.2 – Explaining the Development of APoC and Mole, 2002). Clearly, this research could be expanded to take a reverse perspective; identifying differences in outcome and inferring differences in qualities, conditions, mechanisms, and structures as explanations.

For example, different applicants approached APoC at different states of readiness for commercialisation, even though the scheme was designed specifically to provide funding for proof of concept activity. Some applicants regarded proof of concept as an integrated activity, embracing research, technical, and commercial actions. Others emphasised one or more and supplemented the APoC grant according to the size and scope of their project overall. The very smallest applicants were in a position where an APoC grant was sufficient to fund all their anticipated proof of

concept activity, although this changed as activity preceded. Other applicants recognised that APoC could make only a small contribution to their projected total expenditure, even assuming that proof of concept proceeded smoothly and without unanticipated problems. Scheme procedures did not vary and any applicant was equally likely to incur an identical award decision irrespective of their need for the grant, and the proportion of proof of concept activity APoC was expected to cover, providing the proposal being put forward was internally consistent and reflected their status.

Another difference between applicants reflected the choices open to them and, therefore, the extent to which choice was an influence in their decision-making process. It has already been shown that for some applicants APoC was perceived, or at least claimed, to represent their last opportunity to access external funding for proof of concept activity. In the absence of choice, dependency is total. Other applicants purposefully selected APoC from a range of alternatives, perhaps because a grant is more attractive than a loan, or to maintain another form of independence from a provider of internal funding. A necessary condition was the continuing preference expressed by applicants for grant funding rather than loan funding. Once again, it was possible to imagine APoC functioning by providing loan funding, but take up would almost certainly have been significantly reduced and probably restricted to applicants who genuinely had no alternative, thus making their applications the most risky. Enterprise interviews indicated a strong and continuing preference for grants over loans, even with conditional repayment arrangements. This was supported by observations reported from Scheme Management. APoC procedures were not purposively designed to reflect variations in the extent to which applicants had other opportunities open to them. It is not clear whether information on alternatives was made available to decision-making panels in BDA presentations. If social interaction with BDAs was taking place as expected, it seems likely that the

BDA was aware whether the scheme was the applicant's sole source, preferred source amongst others, or simply an attempt to reduce costs by accessing publicly sourced grant funding, rather than incurring charges for accessing commercial providers. It was likely, however, if the conditions of operation were changed so that BDAs had a direct role in determining the award of a grant, the basis for social interaction with applicants would be adversely affected. In any event, for some applicants accepting a grant from APoC entailed giving up choice and becoming dependent upon the scheme. Applying to APoC was an exercise in choice, even if the choices were as stark as being able, or unable, to proceed.

Details of the reasons why certain applications were rejected are not fully available, but it was possible to compare successful and unsuccessful applications to try to identify any differences in characteristics, conditions, structures, and mechanisms. As indicated previously, in Section 4.0 – APoC Scheme, all enquiries were subject to close scrutiny with less than 25% progressing as far as formal application. Hence, most unsuccessful potential applicants were not considered in this research. The small number of unsuccessful applications considered here were probably expected to be successful - there is no evidence from the interviews undertaken to indicate the slightest expectation that an application going to award panel was considered likely to be unsuccessful - but did not meet one or more criterion in the final analysis at the decision-making panel stage. There does not appear to be a consistent factor in the small number of unsuccessful applications. Lack of success is, therefore, attributed to specific contingent conditions, rather than common factors or demi-regularities.

5.4.4 – Summary

Based upon the TMSA Morphogenetic model, APoC can be represented as a single cycle moving from stable, but unhelpful, structural conditions, through change to a transient phase of new, much more supportive conditions, only to return to unhelpful

circumstances, but relative stability. This view was adequate to explain the scheme as a single cycle of social interaction influenced by the structural conditions affecting the West Midlands. It helps explain why the scheme was initiated and provided a rudimentary account of operating procedures. However, it was not sufficiently detailed to explain the outputs arising from APoC or how and why the outputs were created. While this perspective probably provided adequate detail for simple understanding, the evidence was too weak to justify any modification of internal procedures or seeking learning for developing alternative schemes.

More detailed explanation and deeper understanding can be gained from representing the scheme in terms of mechanisms, structures, and relationships. This perspective suggested multiple plausible explanations for observed outcomes and characteristics. The structural conditions immediately prior to APoC, combined with underperformance of the regional economy, and a desire to assist in drawing benefits from the strengths of the region, was the external trigger to the initial development of a concept for supporting proof of concept activity. The internal trigger, influenced by the external conditions, led to the development of a series of interrelated generative mechanisms that facilitated access to existing support mechanisms which enabled activities perceived as essential in proof of concept to be undertaken. The combined effect was progress towards commercialisation and benefits for the grant-holding enterprise and the community.

The second perspective provided a more detailed understanding and explanation focusing upon the role of mechanisms and interrelationships. It demonstrated the importance of powerful particulars in influencing the initial specification and the freedom of the Managing Agent to design and operate mechanisms that satisfied necessary conditions. The political astuteness of the Managing Agent was also highly significant. This was evidenced by their ability to balance political pressures,

notably in the development of a devolved distribution model that required collaborative action from other partners, at least one of whom had submitted an unsuccessful tender. Additionally, the design of the award decision making mechanism, especially the use of sub-regional decision-making panels, emphasised the extent to which equality and even-handedness was valued throughout the scheme. The perspective demonstrated the pivotal role played by BDAs in progressing enquiries and securing a suitable number of grant applications. It suggested that different phases in the life of the scheme were driven by changes in relationships between mechanisms and stakeholders, as priorities changed. It also highlighted the consequential developments flowing from an initial series of critical decisions.

The third perspective explained the operation of the scheme as a loose guiding framework which allowed individual applications to be progressed in a contextually specific manner. Understanding the scheme in this way gave the impression of rigidity in operating procedures, determined by the mechanisms developed by the Managing Agent, but probably understated the importance of nodes, partners and BDAs acting as 'street-level bureaucrats' interpreting stated requirements at a local level. Really, only the mechanism for making award decisions, and the criteria, were regarded as definitive.

The three perspectives developed here are not mutually exclusive; each builds upon the others to explain different aspects of the scheme. The first perspective highlights changes in the phases of the scheme, whilst the second highlights in more detail how and why the various phases were triggered. The third demonstrates the tension between demi-regularities that underpinned expectations and the contextually specific nature of actual operation.

Transfactual argumentation, based upon five complementary approaches, enabled the research to move beyond empirical observations of APoC, reflected in interview data, to identify influences that impacted upon the three perspectives. Maintaining two pre-conditions appeared essential; a flow of innovative ideas and opportunities for new venture creation. The key influences that enabled APoC to operate as it did included localisation, access to public funding, experience of collaborative activity amongst partners, and a shared culture of valuing support for innovation, including proof of concept activity. Dependence upon APoC and trust in the support provided were also very important for successful applicants and unsuccessful outcomes arose principally because of contingent circumstances for the relevant applicant or grant holder.

The outcomes arising from retroduction demonstrate that explanation and understanding are two distinct, but closely related, issues. Understanding is undoubtedly enhanced by explanation, but plausible explanation is inherently uncertain. Plausible explanation relies upon evidence assessed relative to alternative explanations through counterfactual argumentation.

5.5 – Stage Five - Comparisons between Alternative Theories and Abstractions

The fifth stage in Danermark *et al.'s* (2002, p.109-111) explanatory research process is concerned with comparing alternative theories and abstractions. It builds on the descriptions of events and outcomes and the analysis of alternative abstractions developed in the preceding four stages, recognising that explanations may take many different forms. A distinction is drawn between comparing competing theories and abstractions. In the latter alternatives tend towards being mutually exclusive, or, at least, where one is likely to provide an explanation considered superior to others, and complementary explanations, where alternative theories and abstractions consider different aspects of necessary and sufficient conditions to provide partially

different explanations for different aspects of the phenomenon being investigated. Intuitively, this research was expected to provide partially different multiple explanations. Since certainty can never be achieved, and fallibility is inherent in all social science research, this stage is concerned with assessing the best available explanation, irrespective of whether it emerges from a single abstraction or from combining different perspectives. The outcome from this section is an assessment of the most plausible explanation, rather than a statement of the definitive explanation of APoC.

Montefiore (1956) comments on the relationship between necessary and sufficient conditions for explanation to arise. Reiner (1993, p.63) states that necessary and sufficient conditions are irreducible to one another: they are distinct entities, although a sufficient condition must also be a necessary condition. He goes on to differentiate between general and specific necessary conditions. General necessary conditions contribute to explanations of a more regularly occurring event, but a specific condition contributes towards an explanation of a single occurrence. This research has shown that APoC comprises both demi-regularities and single occurrences – evidenced by demi-regularities arising from broadly applicable necessary conditions and specific outcomes influenced by contingent circumstances. Nevertheless, Reiner still falls back on the falsifiability test of explanation, similar to Hempelian causal explanation, by raising whether explanation is considered inferior science because it cannot be subjected to common testability criteria (Reiner, 1993, p.68). He argues that testing explanation by sufficient condition is superior to testing by necessary condition, because testing sufficient conditions can be fragmented.

The outline developed in this research established opening conditions, but observed outcomes arise only if particular processes result and produce detectable outcomes that satisfy necessary and sufficient conditions. Three different abstractions provided

three different explanations; focusing on APoC as a single cycle of social interaction, as a network of generative mechanisms and relationships, and as a series of individual applications, each unique, but assessed against common criteria. An important question was what constitutes each abstraction? The term 'framework' may be preferred to 'model' or 'theory', but are these terms synonymous? Does this affect comparing alternatives? Does this research provide a single explanation comprising three elements, asking whether the abstractions are actually true alternatives or interrelated elements of a single perspective? The remainder of this sub-section is based upon the assumption that the three abstractions are NOT competing explanations, but complementary contributors to the development of the best available explanation[487].

Collectively, but not individually, the three complementary abstractions show how and why APoC was developed and how and why the scheme operated to produce the observed outcomes noted previously. Several plausible mechanisms have been proposed, each equally able to offer an explanation for some, but not all, of the observed outcomes. Rather than comparing the abstractions put forward with the intention of discovering which of three alternatives had the greatest explanatory power, comparative analysis was intended to show whether, collectively, a satisfactory plausible explanation had been developed. The analysis pivoted on assessing relationships between abstractions.

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[487] Lipton (2009, p.619-620) confirms that there is a separation between knowing and understanding: *"In its simplest form, a causal model of explanation maintains that to explain some phenomenon is to give some information about its causes."* Typically, to provide an explanation is to answer a 'Why…?' question, but the explanation contains within itself a further series of questions that can also take a similar form. This is known as 'the why-regress' (Lipton, 2009, p.620). For example, in this research the question 'Why does an APoC grant facilitate commercialisation?' might illicit a response such as '…because it provides additional financial resources to enable sub-contractors to be engaged'. The response could lead to a further question – 'Why should a sub-contractor be engaged?' and this might lead to a further response such as '…because APoC requires expenditure to be incurred and then reimbursed.' or '…because the enterprise does not possess the necessary skills to carry out the work needed by themselves.'. Either response could lead to yet more questions in a seemingly never-ending chain moving towards, but never quite researching, a comprehensive explanation that requires no further expansion and leaves no opening for asking further questions.

Within each abstraction certain aspects of the scheme are emphasised. Similarly, differing aspects of the antecedent characteristics, the operation of relevant policies and procedures and features of the participants are accentuated. For example, considering APoC as a single entity within a cycle of social interaction tended to place emphasis upon the background context that led to the concept being developed. Viewing the scheme as a series of individual applications highlighted the consequences of differing applicant size, structure, and resource base for the decision to proceed. The relative significance of the factors influencing outcomes varied from abstraction to abstraction and from application to application. Some factors facilitated operations; for example, the devolved implementation model facilitated region-wide access. Other factors had a causal influence; for example, the requirements for reclaiming external costs driving the use of sub-contractors.

Comparing alternative theories and abstractions, when combined with critical realist metatheory assessed relative explanatory power within context. Explanatory power was defined in broad terms – the ability of an abstraction to explain APoC or elements within it. Causation, explanation, and understanding are related, but the link between the various elements was not straightforward and it was necessary to focus, not on the scheme as a whole, but on specific constituent elements and outcomes.

The discourse of explanatory power and its associated vocabulary is closely linked with computational forms of comparative assessment based on quantitative data. This was wholly inappropriate for this research because it assumed that causality was grounded in direct determinism, where regularity was described in quantitative or statistical forms. Explanation is considered a necessary, but often not a sufficient, condition for prediction. To have predictive power a theory or abstraction must be capable of generating empirically testable hypotheses and predictions, which again

emphasise quantification. Predictive power is conventionally assessed by the closeness of fit between reality and anticipated / predicted outcomes, but this leaves open the questions of whose reality and in what terms reality is determined? These concepts closely link with natural sciences and classical experimentation but, in this research, explanation was driven by the desire for clarity in understanding, and prediction by an indication of likely consequences, not definitive quantitative statements.

Examining the scheme using the five approaches to retroductive inference advocated by Danermark *et al.* (2002, p.100) enabled comparison between abstractions. The primary purpose of comparing abstractions was, firstly, to assess the extent to which the abstractions, individually or collectively, provided plausible explanations of how and why the outcomes discovered through either conventional evaluation or evaluation influenced by critical realist metatheory, constituted APoC. Secondly, to determine the contribution of the abstractions, individually and collectively, to understanding the conception, creation and operation of the scheme. The explicit intention was to learn in sufficient detail to foresee possible consequences of amending activities or providing a similar scheme in different contexts. Comparison arises naturally in highlighting the aspects of APoC that feature most prominently within the explanatory components of each abstraction. The expectation was that, collectively, the abstractions would highlight plausible explanations of all important aspects.

5.5.1 - Counterfactual Thinking

Counterfactual argumentation suggested that APoC could have taken one of many alternative forms. For example, it was possible to envisage APoC operating with private sector funding, but this was likely to have had a significant impact on both internal linkages and, especially, output transactional interdependencies. Abstraction

as a single cycle of social interaction would hardly have been affected, because explanation was insufficiently detailed to differentiate between sources of funding. Instead, the overall view was that the scheme could continue and serve identical purposes because the fund provider did not deal directly with individual enterprises. Other abstractions would change, especially in the extent to which they foresaw possible consequences. Abstraction as a network of generative mechanisms and relationships would have shown how any conditions imposed by a private sector funder, and especially their likely requirement for earning a financial return, would impact interrelationships between mechanisms and the fundamental basis of offering a grant. Similarly, individual applicants would be more strongly affected by contingent circumstances, especially where potential outcomes did not conform to private sector expectations. In extreme circumstances, applications might not be able to proceed.

An alternative view suggested that the scheme could continue but target different sectors: again, this would change internal and output linkages. Internal linkages arise from decisions taken in response to input transactional interdependencies. The relationship between inputs and decisions is complex and dynamic, but there was a point where it was necessary to commit to working within the parameters established as structures and mechanisms that were thought to endure and produce regularities, or demi-regularities. For example, the decision to target high technology sectors was established by the scheme designers in the belief that high technology enterprises offered the highest likelihood of sustained economic growth, with consequent effects on employment and GVA. When designing marketing activities and defining recoverable costs emphasis was placed on relevance to the sector. Abstraction as a single cycle of social interaction would show minimal change, but other abstractions would change.

Counterfactual thinking may envisage every decision producing an alternative outcome, creating different contingent circumstances that would be highlighted by abstraction as a network of generative mechanisms and relationships. Each adjustment to internal mechanisms and each change in output alters the scheme and the possibility of achieving desired outcomes. For example, the consequences of making the grant available immediately, prior to expenditure being incurred, would significantly reduce control and heighten the risk of an applicant using the grant for costs deemed not recoverable. It seems highly unlikely APoC could exist in the form it took were any of the decisions made and internal linkages to be removed or eliminated by a countervailing tendency. APoC in the form explained was crucially dependent on the envisaged internal mechanisms operating holistically, as suggested.

Imagining the absence of regionalisation and localisation in the implementation of support policy was an example of an idiographic counterfactual. Government purposefully implemented policy that facilitated local mediation by establishing Regional Development Agencies who took the primary role in support at a regional level, using devolved public funding. This was fundamental to APoC. Abstraction as a single cycle of social interaction provided the most plausible explanations and indicated the possible impact on implementing a similar scheme in a different context.

Actual practice, where support policy interfaces with enterprises, was conditioned by the interpretation of stated aims and objectives and the consequent actions undertaken by local providers. BDAs played a crucial role and enterprises reported differing experiences conditional upon which node and BDA supported their application. Local interpretation had a material impact on the outcome of any given

application. Abstraction as a series of individual applications provided the most useful understanding and explanation from this perspective.

Counterfactually, it seemed extremely unlikely that APoC would have existed in the form that it took in the absence of both non-routine and routine interaction. Since some of the partner institutions provided almost identical services, competition between partners could have assumed more importance than co-operation. Had this occurred the foundation for APoC might not have existed. Access to public funding probably could not have been obtained in quite the same way, or with quite the same ease, without strong local connections. Additionally, prior experience of working collaboratively on other publicly funded projects was a strong foundation for co-operation between local partners. Its absence would probably have shifted the extent to which the devolved distribution model could have operated. It would be unlikely that the interaction between senior staff which led to APoC would have occurred. Localisation in pre-existing support service policy could not be considered a necessary condition for APoC, but was undoubtedly a very strong influence on the precise form taken by the scheme.

An absence of innovative ideas suggested that entrepreneurship would be restricted to 'me too' ventures that could derive competitive advantage from more efficient, higher quality operations than firms then active in the market. It was difficult to imagine a total absence of innovative ideas, but it was possible that for short periods there were no innovative ideas for projects that met predetermined criteria. APoC could have continued with different approval criteria, but this would have fundamentally changed the basis of the scheme. The absence of a desire for innovation by Government, an example of synthesised counterfactual argumentation, would negate the need for APoC from both a demand and a supply-side perspective. Abstraction as a single cycle of social interaction provided an explanation of why the

scheme was created specifically to meet the needs of enterprises seeking to commercialise innovative ideas. Hence, in this scenario, although social interaction might lead to the development of a scheme with an alternative focus, it could not be an alternative to APoC.

Absence of the need to demonstrate proof of concept negates the fundamental rationale for APoC. However, proof of concept was a basic requirement for sound commercial decision-making in enterprises seeking to commercialise innovation. In the absence of APoC, private sector providers would be likely to seek evidence of the potential of the proposed project as a basic criterion for the provision of a loan or access to other forms of finance, although comments made by Enterprises indicate that loan finance for proof of concept may not be perceived as acceptable. The lender seeks to safeguard repayment of their loan and proving both technical and commercial potential becomes essential to prospective commercialisation funded through loans. Abstraction as a series of individual applications provided the most detailed explanation.

5.5.2 - **Social and Thought Experimentation**

Social and thought experimentation illuminates the conditions necessary for social interaction to take the form it does. Social experimentation is difficult to control, may lead to unintended consequences, and may even be dangerous in certain situations. However, it is often not necessary to actually disrupt social conventions if thought experimentation is used as a form of counterfactual argumentation.

When engaging in retroduction, a researcher must bring their knowledge of conventional routine social interaction into the research context. Abstraction as a network of generative mechanisms and relationships explains that for APoC to function as it did a great deal of non-routine social interaction must have occurred.

For example, routine interaction would have probably taken place among relatively junior staff in the various institutions that offered similar services. However, for interaction to trigger the mechanism that initiated APoC and provide the foundation for the subsequent collaboration which underpinned the devolved implementation model, non-routine social interaction must have occurred at a senior level. Like-minded, relatively senior individuals first conceived and developed the concept of APoC and moved the idea forward, developing processes and procedures adopted within the scheme. Precedents established through routine interaction made it possible to utilise a devolved distribution model and achieve consistent, region-wide coverage. Achieving regional coverage via the devolved distribution model was a necessary condition. Neither abstraction as a single cycle of social interaction, nor abstraction as a series of individual applications, was sufficiently informative to recognise the importance of non-routine social interaction.

Thought experimentation helped establish what behaviour would destabilise social order. In turn, this indicated the limits to variations in participant behaviour that can maintain stability and enabled speculation concerning likely reactions if unacceptable behaviour took place. For example, APoC established a 'ritual' of BDAs making presentations to the decision-making panel on behalf of applicants. Several applicants commented that this appeared to be a missed opportunity to sharpen presentation skills and to better understand the expected content of a grant application. Would it have de-stabilised the scheme to have allowed applicants to make their own presentation? Abstraction as a series of individual applications indicates strong support for this, but did not provide a view from a Scheme Management perspective.

The power of expectations and routine social interaction could have been demonstrated had one party deliberately acted in a non-conventional manner,

disrupting the processes that maintained social order. For example, a BDA treating an applicant as subservient, ordering certain actions to be taken, disrespecting the applicant's social status, and emphasising their own perceived superior knowledge. To do so deliberately as an experiment would not be ethical, and was not possible for this research because APoC had closed. However, it was possible to imagine the consequences expected to arise. It would threaten the formal relationship within APoC and might have caused the applicant to withdraw or fail. Behaviour such as this cannot be reversed, causing a breakdown of trust between the two parties and would lead to significant change in structural conditions impacting on APoC for that applicant. Abstraction as a network of generative mechanisms and relationships indicated that such behaviour would disrupt the functioning of generative mechanisms, and might damage outcomes through a lack of supportive action. Abstraction as a series of individual applications reveals the likely impact upon individuals and shows that the breakdown of social interaction would have a demotivating impact, possibly leading to certain applicants withdrawing from the scheme on the grounds of not wishing to work in close association with a BDA perceived as disrespectful and uncooperative.

In this research imagining disrupting the norm by removing the structural condition imposed by defining target industry sectors is an obvious example of a thought experiment. One perspective was that opening APoC to applicants from any sector would give the decision-making panels the opportunity to support strong applications that might help achieve the stated objectives. However, to do so might decrease opportunities for weaker applicants in the stated target sectors. The consequent conditions might be that the overall standard of applicants rises, as applicants from sectors currently not being targeted seek to prepare their best possible case for the BDA to present. Other consequent effects could include a loss of focus and specialisation, since BDAs who were capable of specialising in a wider range of

sectors would be needed. Alternatively, specialisation might increase as node managers need to recruit more BDAs who specialise in sectors currently outside the target groupings. In reality, applications were considered individually not collectively and it is not safe to assume that only the strongest were actually funded. There is no reason to assume that changing target sectors would automatically lead to funding stronger applications. Each application was considered on its own merits and, whilst there was a limit to the funding available, when the panel reviewed an application deemed suitable, and funding remained available, then a decision to recommend an award was made. The panel decisions were necessarily subjective, although a systematic form of data evaluation was employed. A relatively weak application might be recommended for funding through human error, or through the 'halo' effect of not being submitted in a strong batch, giving the appearance of being comparatively strong. This illustrates the importance of considering different abstractions as a collective explanation, because abstraction as a network of generative mechanisms and relationships highlights the consequent effects of changing target sectors, but abstraction as a series of individual applications is needed to understand the impact on specific enterprises.

5.5.3 - Exploration of Pathological Instances

Pathological instances are circumstances in which the preconditions for a phenomenon to appear are manifested more clearly than normal. This is typically associated with events that challenge or disrupt normal structures and mechanisms.

During the transition from phase one to phase two, as defined in sub-section 4.2 - Operation, Scheme Management familiarised themselves with operations and any special pre-conditions were resolved. In the early stages of phase three minor adjustments were needed in some areas to sharpen the focus on the projected outcomes. The crux was defining to what extent variation in operating conditions

could be tolerated and APoC still function, even though the scheme would, ultimately, probably not have been able to operate in precisely the format that it actually did. All three abstractions indicated that 'normal' conditions ensued in phase three and it was not possible to justify categorising any specific event as 'pathological'. Indeed, for all participants, the principal requirement was not to provoke any situations that might challenge necessary conditions, or disturb mechanisms that were fulfilling their purpose. The scheme continued operating in 'normal' conditions until the new Government revised support policy, forcing the transition from phase three to phase four.

Phase one and phase four both presented challenges that highlighted pathological circumstances which, whilst similar to one another, contrasted markedly with phase three. The transition from phase three to phase four, marked by new Government policy, constituted a major challenge to necessary conditions and mechanisms were seriously disturbed, especially by the consequent impact of withdrawing public funding completely, at an earlier point than had been expected. Again, all three abstractions explained the change from 'normal' to 'pathological' circumstances, but in different ways. Abstraction as a single cycle of social interaction explained the transition in terms of structural elaboration - morphogenesis. In terms of a network of generative mechanisms and relationships phase four was explained as a significant change in relationships with one principal provider of public funding, even though public sector funding could have been maintained from ERDF. Change of Government policy disrupted the rules and procedures that, whilst not explicitly changing the generative mechanism used to obtain public sector resources, materially altered the qualifying criteria. Abstraction as a series of individual applications also showed how revised conditions fundamentally shifted dependency on the scheme by some applicants.

It was known that APoC would have a finite life, but it was expected that time would be available to evaluate outcomes, plan any necessary adjustments, and put in place funding to allow follow-on grants. Change in government policy brought the essential mechanisms that sustained APoC into sharp relief, which justifies why phase four can be considered pathological. Scheme Management became aware of a heightened need for collaboration and co-operation, as efforts were made to process as many applications as possible before funding was withdrawn. However, it was important to ensure that standards were maintained and qualifying criteria were not relaxed. Grant holders were given tighter deadlines, leaving less time for experimentation when developing new products and services.

An alternative perspective suggested that APoC can be considered 'pathological' when operating in phase three. This alternative view was explained by abstraction as a single cycle of social interaction. 'Normal' conditions were exhibited during phases one (pre-APoC) and four (post-APoC) when no public funding explicitly dedicated to proof of concept activity was available. Morphogenesis (structural elaboration) occurred, creating phase two with structural reproduction (morphostasis) enabling phase three to endure for a brief period before further structural elaboration (morphogenesis) returned conditions to almost, but not quite, an exact replication of pre-APoC conditions.

Conditions quickly returned to almost their pre-APoC state, with limited local access to support for enterprises pursuing innovation and no public funding dedicated to proof of concept activity; the latter only available as an integral element of a more extensive bid for public funding at a national level. The truncated end to the scheme, rather than gentle running down, completely altered structural conditions and did not enable sufficient time for follow-on funding to be sourced.

It was expected that structural conditions reflected necessary conditions for APoC to operate and were uniform for each applicant applying at the same point. Abstraction as a series of individual applications explained operations during phase three as demi-regularities that apply to all applications. However, contingent circumstances vary from applicant to applicant. For example, it was expected that grant holders would implement their action plan virtually as outlined in their grant application. Many were able to do so (sub-section 5.2.3) and the demi-regularity was for the grant to be used as outlined in the action plan. Contingent circumstances meant some were unable to do so and 'challenged the norm' by seeking variation to agreed timescales and expenditure limits, or sought to transfer fund allocation between qualifying activities. APoC appeared to be operating within tightly defined parameters that constituted elements of the structural conditions which enabled APoC to operate as it did. This included operating within precisely defined target industry sectors with specified qualifying activities and requiring an approved activity plan as an integral element of each grant application. However, flexibility was shown because requests for variation to deal with unforeseen circumstances were readily accepted.

5.5.4 - Exploration of Extreme Cases

Actions taken by individuals that conformed to expectations were congruent with shared values associated with providing support for innovation, but at the same time, sought to make effective use of public funding to produce outcomes that benefit the region. The conduct of the decision-making panel meetings and the process followed had the characteristics of ritualistic behaviour, where following the established pattern was an element of ensuring consistency, fairness and openness in justifying decisions made. An extreme case concerned an applicant (E29) for whom the award of a grant genuinely made the difference between survival and abandoning the project. Detailed further investigation in the context of abstraction as

a series of individual applications showed that most applicants had alternatives if a grant was not awarded.

The assumption underpinning examination of extreme instances is that the tensions exhibited ensure necessary conditions and mechanisms manifest themselves in their most pure form. This suggested that abstraction as a network of generative mechanisms and relationships was likely to be most efficacious in explaining extreme instances. It is not clear, however, whether the circumstances would also mean that any countervailing tendencies or counteractive mechanisms appear in a pure form, thereby being equally effective in cancelling out any consequent effects. Although extreme conditions apply, the mechanisms are still operating in an open context and, unlike laboratory experimentation in natural sciences, it would not be possible to isolate generative mechanisms from countervailing tendencies to ensure that only generative mechanisms were active.

Extreme examples under normal operating conditions, phase two of APoC, are of most interest here. Scheme activity during phases one and three, considered as pathological circumstances, could be regarded as extreme examples but conventionally, extreme examples exist where normal interactions are present, but in a pure form. For example, Danermark *et al* (2002, p.105) cite ritualised social interaction at funerals as an extreme example of social interaction that is also found in normal social situations.

Abstraction as a series of individual applications explained the experience of each applicant who made a formal application. Firstly, the perspective was useful in identifying situations where the consequent outcomes for any given applicant assumed extreme importance. Heightened importance increases tensions for all actors in the scenario and increases pressure for social interaction to take place in as

near perfect a form as possible. Secondly, the perspective allowed comparative analysis across different applicants.

One criterion used to define an extreme example was where the Enterprise interviewee was (or claimed to be) entirely dependent upon APoC for the future of their project. The circumstances were considered extreme because in 'normal' instances applying to APoC represents a voluntary choice for obtaining external funding. The conditions of obtaining ERDF monies included that the scheme should not be a 'funder of last resort', possibly because the risk would then be perceived as too high. Claiming to be dependent upon APoC was not as straightforward as simply a matter of size and business experience. It was likely that projects located within established enterprises were eligible for support from within the enterprise, whereas projects put forward by a single individual were entirely isolated if their application to APoC was not successful. The scale of the resource support required and degree of flexibility inherent in the project were equally important determinants. Additionally, there was an association between the degree of risk inherent in a given project and the extent to which APoC was actually the sole source of funding, other than the qualifying percentage required to be eligible for the grant. Despite ERDF conditions, the comments made by Enterprise interviewees suggested that many perceived APoC to be their last opportunity to receive external support for proof of concept activity.

In terms of process, the ritualistic elements of the decision-making panel still applied to extreme case examples. Extreme cases, however, influenced decision-makers to look more leniently upon a specific application when the BDA made clear that circumstances were exceptional.

5.5.5 - Comparative Analysis.

Comparative analysis, often based on combining one or more of the approaches discussed in this sub-section, underpins assessment of the relative explanatory power and contribution derived from each abstraction. For example, four aspects of a hypothetical change (social experiment) in ritual behaviour (social interaction), such as the operation of regional award-decision panels, can be compared. The consequences of making a change to enable applicants to present their own applications to panel can be considered to impact upon the panel, scheme administration, the applicant, and the BDA.

Decision-making panels would probably have observed substantially more variation in the format and standard of presentation. Even though guidance would still have been given by BDAs, applicant presenters would place emphasis on points they favoured. Given most applicants associated more with technology than business, technical aspects of the proposed products and services would probably feature prominently. As a consequence, panel members would need to tease out points, through intensive questioning, to confirm that the applicant met the business criteria for an award. Presentations would take longer and decisions would be made with less confidence, perhaps placing panel members under greater stress through feeling that they were making a personal recommendation, rather than enforcing externally specified criteria. One consequence might be that panel members would take a more conservative approach to recommending awards and this could lead to the rejection of applications which might otherwise have been deemed successful.

Scheme administration would probably require more panel meetings to consider the same number of applicants. Guidance would have been needed to help panel members address variability in presentations and the length of time to process applications would have been extended. There would probably have been no

material effect in the event of a successful application, other than consequent actions taking place later than might otherwise have been the case, but unsuccessful applicants might have looked for external reasons for their failure to win a grant and may have placed blame on inconsistency in guidance, BDA abilities to support their application, panel member bias, and administrative incompetence.

Applicants may have achieved greater learning from being placed in an unfamiliar situation, but the risk of failure might have increased. Inconsistency may have arisen in interpreting guidance and there may have been a lack of appreciation of why it was necessary to balance commercial and technical criteria when deciding the outcome of an application. Applicants would have been able to gain a sense of how well received their application was during the presentation and this may have led to changing behaviour and ad hoc attempts to recover a situation that was perceived as sliding out of their control. There may have been an opportunity to modify behaviour and achieve a more positive outcome, but there is a natural human tendency to become defensive when something about which you care deeply appears to be threatened. This may have brought more conflict between panel members and applicants, which might have further extended the time taken to process each presentation. Additionally, applicants may have already had some dealings with members of the panel, in their conventional role in the support community, and rejection or even opposition to an application during panel meetings, might de-stabilise an otherwise effective working relationship.

BDAs would be placed in an invidious position. They have to guide an applicant through the process, but without being able to take effective action to adjust or correct an application that was not proceeding as well as might have been expected. In the event of a successful application, the BDA would be perceived as simply fulfilling their role as expected. However, they would be likely to attract considerable

adverse comment and blame in the event of an unsuccessful application, even though they were not in a position to materially affect the outcome.

Abstraction as a single cycle of social interaction did not provide sufficient detail to reflect and explain detailed change in the internal operations of the scheme. Adopting this abstraction alone would probably lead to the conclusion that the suggested change had no material impact on the operation of the scheme, providing scheme management made the changes necessary to ensure that application throughput and quality were not adversely affected.

Abstraction as a network of generative mechanisms and relationships might have detected and explained some changes in the volume of interactions resulting from more, and probably longer, panel meetings, and social interactions between applicants and BDAs. However, the principal change might have been observed in terms of the reported level of learning achieved by enabling comparatively inexperienced applicants to present their application in a relatively benign environment. There might have been some difficulty substantiating whether learning occurred, because its impact only becomes visible in subsequent applications by the same enterprise to follow-on activities or alternative schemes.

Abstraction as a series of individual applications would be needed to explore and explain the consequences of such a change in detail, but would be limited to assessing the impact upon the applicant. In addition to learning achieved from the experience of presenting the application, the relationship between applicant and BDA would be altered, because the applicant would now have had the opportunity to enjoy a brief interaction with the decision-making panel. This might have led to more extreme reactions by applicants to both successful and unsuccessful outcomes.

On balance, the negative effects of allowing applicants to make their own presentations – inconsistency in presentation, additional time required, potential impact on social relationships – probably outweigh the advantages – greater involvement, sense of responsibility and learning achieved by applicants. APoC could still operate, if such a change were made, but the relative harmony and goodwill that was evident during the process would be at risk.

5.5.6 – Summary

The three abstractions assessed in this sub-section are not alternatives for one another. Each emphasises different elements and aspects of the scheme and hence, the three are complementary. Combining all three brings a fuller, broader, deeper understanding and explanation of important elements of the scheme, which integrate to form a more useful explanation than any single abstraction considered here. Nevertheless, the nature of plurality in causal influences, activity within an open system, and the critical role of abduction and retroduction in developing abstractions create uncertainty. Hence, it is not possible to define what would be required to establish a definitive 'complete' explanation, nor to determine whether a comprehensive explanation has been achieved.

Conventional comparison focuses upon assessing explanatory power, but this is not appropriate for this research because comparison is not a simple, straightforward task of discriminating between alternatives and producing a ranking of the abstraction most likely to yield robust predictions. The approach adopted assesses plausibility of explanatory influences sufficient to enable understanding and the identification of possible consequences of change. The conventional discourse of explanatory power does not embrace this task.

Abstraction as a single cycle of social interaction has strengths in explaining relationships with and between elements of background context. This perspective was able to suggest consequences arising from offering a similar scheme under different background influences, which is useful learning for scheme designers proposing operations in other regions. Additionally, this abstraction provided learning from changes to background context across the life-cycle of the APoC scheme.

Abstraction as a network of generative mechanisms and relationships has strengths in explaining trigger mechanisms, and assessing the impact of changing inputs on outputs produced. This perspective was able to explain detailed changes at an operational level and assess interrelationships between generative mechanisms active both within APoC and spanning the boundary of the scheme in the form of input and output transactional interdependencies.

Abstraction as a series of individual applications offers strengths in developing a case study approach to assessing the impact of the scheme on individuals and enterprises. This perspective was able to explain, through comparative analysis, the occurrence of demi-regularities with broader applicability than a single enterprise. Equally, contingent circumstances were identified which help explain variations in the impact of the scheme on different applicants.

5.6 – Stage Six - Concretisation and Contextualisation

The final stage of Danermark ***et al.'s*** explanatory research framework (2002, p.109-111) concerns concretisation and contextualisation. It focuses on structures, structural conditions and generative mechanisms, with particular reference to the way in which these features manifest themselves in real circumstances: *"… the process of concretization serves to reveal how it* [a mechanism] *functions in different contexts."* (Hindriks, 2007, p.2). Often, retroduction results in abstract perspectives, but this

stage brings the analysis back to real situations, an especially important stage in applied research.

Differentiating between structural conditions and contingent circumstances is crucial. Drawing on depth ontology analysis highlights interrelationships between structural conditions and mechanisms, especially where located in different strata. In social science dynamism is inherent and changing interrelationship are the norm.

Concretisation plays an important role in explanation derived from retroduction by drawing from Lipton's (1990, p.258) contrastive approach, which explains why an outcome occurs in preference to an alternative possibility (why x rather than y?). This form of explanation establishes why regularities, essential to conventional forms of causal explanation, are not operating in a particular context showing how active mechanisms are affected by countervailing influences. It also provides a clear explanation of why the context in which the research is conducted is a crucial influence on data interpretation and, consequentially, why it is not possible to generalise findings.

This research focuses upon real, concrete circumstances when APoC was conceived, created, and functioning. Concretisation and contextualisation are orientated towards explanation of the countervailing forces interfering with possible demi-regularities, rather than simply describing the manifestation of structural conditions and generative mechanisms, which was the focus of sub-sections 5.1 – Stage One - Description and 5.2 - Stage Two – Analytical Resolution. These, while reductionist for clarity, were consistently concerned with manifestation of real conditions and mechanisms, rather than abstract perspectives. Structure and structural conditions were reflected principally in the seven aspects of background context highlighted earlier, whilst the fifteen generative mechanisms may be partial

explanations for outcomes, both observed and determined by retroduction (Table 9). The fundamental question is whether structure, structural conditions, and generative mechanisms would manifest themselves in an identical manner in another context, or as and when influences on APoC changed?

5.6.1 – Structure and Structural Conditions

Structural conditions manifest themselves through three groupings of influences that form background context. Firstly, structural conditions that influence the relationship between APoC and the public sector: these were not specific to APoC and would probably have manifested themselves in an identical manner in any other context. The belief that innovation drives economic growth, development, and prosperity was indicated in public support for innovation, evidenced by the prominent discourse in diverse sources such as newspapers, (broadsheet, Financial Times, 2014 and tabloid Shipman, 2011), in parliament (BISC, 2013) and in academic research papers (Roper and Xia, 2014). All emphasised the perceived importance of entrepreneurship and innovation to the economy. Government policy for supporting business enterprise, not only for entrepreneurship and innovation but in the provision of practical assistance such as training, was implemented through regional development agencies that were given freedom to determine local priorities within the espoused framework (National Archives, 2013). Making use of public resources required acceptance of certain conditions, principally to justify expenditure in the form of a return to the community, evaluated in terms of approaches and criteria set out in HM Treasury's 'Green Book' (Grice, 2003).

The change of Government in 2010, which brought about the abolition of regional development agencies and precipitated the demise of APoC, led to some aspects of local support policy being taken over by Local Enterprise Partnerships (LEPs) and local councils. In the revised context local activities were now funded by a much

broader and more diverse portfolio of providers; for example, Staffordshire Business Innovation Centre was funded by "…*local sponsors, the European Regional Development Fund, UK Business Incubation, Staffordshire County Council and various other national and local funding organisations…"* (Staffordshire BIC, 2013). The revised context would significantly change the relationship between any replacement scheme and the public sector, although belief in the contribution of innovation to regional growth, development, and prosperity must remain. The principal changes would be manifested in changes to management structure and strategy, reflecting local expectations[488] with revised mechanisms connecting the scheme to funding providers.

Secondly, two influences which, in this research, have been examined from the perspective of APoC and their impact in the West Midlands. Private sector criteria for the provision of funding to support proof of concept activity appear focused on securing returns considered adequate for the perceived risk taken in funding innovation at a stage before commercial potential has been demonstrated. No occurrences of independent private sector sources of funding specifically dedicated to proof of concept activity were encountered in this research, other than where larger enterprises (for example, E33), which were part of a group of companies, drew internal resources to supplement their APoC grant and were required to contribute *"…acceptable…"* returns to Head Office. Other enterprises included loans within their capital structure, but none are known to have been obtained specifically to fund proof of concept activity. Nevertheless, the expectation, especially amongst smaller enterprises and individual innovators, was that it would be necessary to give up a substantial equity stake in the proposed enterprise, or to provide personal collateral, to secure a loan from a private source. This would incur '…*extortionate...*' interest

[488] Although APoC was based on meeting local needs.

charges, seen as a ‘Sword of Damocles’ hanging over them. Undoubtedly, private sector providers would have been willing to provide funding on terms satisfactory to themselves, but the perceived impact on enterprises led to market failure in private sector provision. This forced the majority of enterprises to rely on internal funding and created very low levels of activity in private sector finance.

It is impossible to be precise about other contexts, since none were investigated as part of this research. However, it is perfectly plausible to infer that the influences would form virtually identical elements of background context in other regions of the UK, even though in detail, impact is conditioned by contingent circumstances. It is highly likely, therefore, that structural conditions would be replicated in other contexts and would manifest identical characteristics.

Thirdly, published statistics indicated that economic performance in the West Midlands did not reach levels achieved in other regions of the UK perceived to be comparable. This was manifested in lower figures for employment, GVA, and rates of innovation. It is not known whether the West Midlands suffered from an identifiable disadvantage vis-à-vis comparable regions. Statistical data covering the same performance indicators was available for other regions and the impact in the West Midlands was to motivate ‘powerful particulars’ to seek approaches to boosting economic performance, leading to the decision to focus upon improving rates of innovation, influenced by belief in the perceived relationship between innovation and economic performance. There was a declared intention to improve regional GVA and employment as a way of increasing economic activity and one of the perceived causes of low levels of innovation was the lack of public sector funding for proof of concept activity. The existence of proof of concept funding schemes in other regions of the UK was evidence that comparable impacts were manifest outside the West Midlands and had led to similar decisions to find ways of boosting innovation activity.

Improving economic performance would probably lead to changes in the targeting of support, with more focus on emerging specialisms.

The concept of APoC arose primarily because of the influence of powerful particulars who occupied senior positions in public sector support institutions in the West Midlands. Background context at the inception of the scheme did not directly force the decisions that, in combination, led to APoC. There were alternatives that might have been taken up and could have achieved the principal objective. However, perception of comparative advantages and disadvantages held by powerful particulars, and their interpretation of principal influencing factors, led to the critical decision outcomes that privileged the concept of APoC over alternatives.

5.6.2 – Generative Mechanisms

Generative mechanisms associated with the operation of APoC can be divided into three different groups:-

1. Mechanisms in the environment, probably replicated in most similar contexts, which provided specific inputs to APoC or made use of outputs;
2. Mechanisms internal to APoC producing scheme-specific outputs; and
3. Mechanisms operating within certain enterprises associated with the scheme.

Some of the constituents of each of the three groups may be mechanisms found in similar situations, but which vary in accordance with contingent circumstances.

The groups are not mutually exclusive and being categorised in one group does not rule out also being part of another through interrelationship and interaction. Given the extent of interconnectivity, it is difficult to define the line separating one mechanism from another, especially longitudinally. All mechanisms were essential to the successful operation of APoC, some producing outputs that formed inputs into the next mechanism, and so on, producing chains of generative mechanisms.

Additionally, different groups of mechanisms tend to produce different types of outputs, and it is through the type of output produced that some mechanisms can be recognised. For example, mechanisms that formed input transactional interdependencies and provided essential requirements for the scheme included the mechanism that enabled access to public sector finances for proof of concept activity. There may be several points in an interconnected chain of mechanisms between trigger point and eventual outcome where active operation of the chain becomes visible. Arguably, the ultimate manifestation of active operation of all fifteen generative mechanisms, identified in sub-section 5.4.2.2.1 - Background Context, Necessary Conditions, Contingent Circumstances and Principal Mechanisms, is that APoC came into existence, operated, and produced the outcomes observed through conventional or critical realist evaluation, or inferred through retroduction.

Mechanisms that enable successful innovation to boost economic development, growth, and prosperity exist in the environment and capture outcomes from successful innovation, not limited to outcomes arising from successful commercialisation[489]. The existence of such mechanisms is manifested in knowledge transfer activities, learning, and communication that impact upon supply-chain operations, where goods and services change hands to influence other activities in the economy. They create demi-regularities, allowing new knowledge and new products and services to flow freely into the environment, unless counteracted; for example, by the action of patenting that might limit free flow for a specified period. An innovator was able to pay for their gym membership through money earned by exchanging knowledge for cash (royalty payments, sub-contract work and so on), while their gym membership contributed towards triggering the need to employ personal trainers, buy equipment, acquire premises and so on, necessary

[489] Knowledge and learning arise at intermediate points throughout innovative activity, such as establishing new processes for producing and using new materials.

for personal fitness activities. There are so many interrelationships that it is difficult to trace precisely the network of relationships that regularly lead to specific outcomes. However, in the context of the APoC scheme, enterprises with successful innovations commercialised with support from a grant (for example E26) and enterprises yet to achieve successful commercialisation, but with specific learning achieved with APoC support (for example E07) can be identified. Products developed by E26 are readily visible in the community, having passed through the distribution channels (mechanisms), creating employment, and contributing to the multiplier effect of monetary exchange. Learning achieved by E07 is traceable in the industry, and has been used to good effect by other enterprises producing commercially viable products.

In APoC it was expected that primary outputs would interlink with dissemination mechanisms to fulfil the purpose of boosting GVA and employment. Had circumstances blocked this interrelationship, or had no dissemination mechanism existed, then scheme outputs would have remained locked into those enterprises creating the output. It is not clear what might have followed consequentially, but APoC would not have been able to satisfy the expectations of the scheme developers.

Mechanisms that provided a flow of innovative ideas, some meeting APoC approval criteria, originated in creativity, whether leading to capitalising a pre-existing opportunity or developing something entirely new. These mechanisms manifested themselves in research and experimental activity as ideas which were refined until sufficiently advanced to undergo testing. Similar mechanisms must be present in any context where innovation occurs. Of course, not every innovative idea was destined for APoC and, consequently, elements of mechanisms found in the West Midlands needed to interact with elements of mechanisms that enabled the scheme to be

marketed to attract prospective applicants. The success of this interrelationship was heavily dependent upon networking, since it is known that many eventual applicants became aware of APoC through existing contacts with support institutions. The criteria requiring applications only from certain sectors effectively blocked the development of a demi-regularity allowing all innovative ideas in the region to be channelled towards the scheme. Whilst the visibility of applications was a manifestation that such mechanisms exist and operate, the success of the scheme cannot be wholly attributed to this mechanism. Much depends on contingent circumstances, such as the extent to which an applicant was dependent upon an APoC grant, or similar, and on the timing of when the scheme was available relative to progression towards commercialisation.

This mechanism arose from the need for creative individuals to seek advice and help in progressing their idea towards commercialisation. It relied on interrelationships between providers of a wide range of support forming a bespoke 'package' that developed over time as the creative idea matured. The interrelationships are flexible and dynamic and allowed deficiencies to be compensated by other support.

Mechanisms for regular interaction between senior staff in partner institutions manifested themselves at both strategic and operational levels, and in both routine and non-routine form[490]. It was likely that similar mechanisms were present in any region where several support institutions offer both competing and complementary services. In the West Midlands routine interaction took place at a strategic level in the form of semi-regular scheduled meetings involving the RDA, with the aim of

[490] It is difficult to say precisely what differentiates routine from non-routine interaction in a scenario where the participants themselves establish regular interaction. There is no obvious imposition from an external source to meet regularly, but participants perceive it to be in the best interests to do so. Whilst much of the agenda of regular meetings probably deals with issues that would be described as routine, non-routine special issues, such as APoC, may arise. The issue is then probably treated as non-routine and addressed separately outside regular routine interactions.

responding to Government initiatives and maintaining a coordinated approach based on shared understanding of key issues facing the region. This created routine interaction at an operational level, influenced by senior staff, where partnerships were formed to offer services in a collaborative manner. Non-routine interaction then occurred, interwoven with routine interaction at both strategic and operational levels. The idea for APoC, whilst originating in non-routine interaction, was taken forward as a special project and eventually led to routine interaction at an operational level as the scheme was implemented. The relationship between routine and non-routine interaction exemplified the flexibility that became evident throughout APoC.

The mechanism almost certainly arose from the influence of needing to remain strategically aware of activities being developed by institutions who would otherwise become competitors across the region. Additionally, senior staff in particular exhibit an affinity, almost a love, for the West Midlands and wanted to take action which they perceived to be in the best interests of supporting enterprise. Given that public sector resources were, in the years immediately prior to APoC, being channelled via the local RDA, it was in everyone's best interest to remain closely aligned with their aims and objectives.

There was no evidence of APoC arising from, or in connection with, any demi-regularity stemming from these mechanisms. Change in the West Midlands was unlikely to impact upon the functioning of basic mechanisms for either routine or non-routine interaction. However, given the importance of contingent circumstances – APoC being conceived as a direct response to particular perceived deficiencies in the region – change in the environment might have led to a scheme that took a very different form.

The previous mechanism laid the foundation and provided the trigger for a series of interactions which, whilst often drawing upon standard mechanisms that would be found in any other similar context, resulted in 'APoC specific' outcomes in this context because of the impact of contingent circumstances. Mechanisms for the initial development of APoC, including specifying target sectors and criteria for the progression of applications, were highly specific and responded to specific aspects of background context. For example, the desire to boost GVA and employment by concentrating upon innovative enterprises in the high technology sector was perceived as most likely to offer high growth potential in the longer term, even though individual products or services are volatile. Progression criteria sought to support legitimate businesses with on-going potential and entrepreneurs with a commitment to commercialisation. This mechanism which, being the starting point for developing a working scheme, must be present where any support scheme is devised manifested in the specific format of APoC. It exhibited strong interconnections with background context and mechanisms active in the environment, as well as with mechanisms active within the scheme. Locally, the mechanism was highly unlikely to change; the only other realistic alternative being not to develop APoC. Outputs may differ in response to contingent circumstances; for example, if all available grant finance was allocated very early then criteria for progression would become more stringent.

A series of generative mechanisms exhibited characteristics of producing bespoke outputs, despite following straightforward, well established procedures. Standard mechanisms normally exhibit sufficient flexibility to cope with contingent circumstances, different ideas, and detail but, like demi-regularities, are broadly similar across a range of applications. For example, mechanisms for gaining access to public sector finances to fund proof of concept activity manifested in a wide range of schemes offering support services, both across the West Midlands and other

regions. In this research, access to public sector funding was via the local RDA and since they played a key role in the initial development of the concept it was extremely unlikely that they would reject an application for funding, providing sufficient evidence was given to justify use of public resources.

Another standard mechanism producing bespoke outcomes was the mechanism for selecting a managing agent by competitive tender. This was modelled on an oft-used procedure within the EU and made use of processes commonly associated with the official EU journal for attracting bids for funding. Found in many different contexts, this mechanism had a strong common core but exhibited the flexibility to respond to contingent circumstances. It manifested itself in the selection of the most suitable managing agent, capable of delivering outputs that met expectations, but ran the risk of alienating unsuccessful bidders. Selection criteria were likely to include a mixture of the perceived most effective and efficient bid and the term 'value for money' was likely to be cited frequently as a 'catch-all' justification. In the West Midlands it was known that at least one institution ultimately becoming a partner in APoC submitted an unsuccessful bid. There was likely to be very little change in the manifestation of the mechanism from context to context, even though actual outcomes varied widely according to circumstances. This mechanism, rather than any other, almost certainly arose from following custom and practice in the support services sector.

Mechanisms for developing and operating a devolved distribution model, including coordinated, uniform BDA support, were highly specific to APoC and there is probably no other identical manifestation found in other contexts. Again, the process / mechanism of implementing simultaneous tight-loose properties, which allowed freedom for the Managing Agent to develop and operate a scheme to their design providing it delivered outputs to expectations, was likely to be found in other contexts

albeit exhibiting differences in detailed operation. The contingent circumstances, including the expectation of uniform access and uniform support provision across the entire region, were probably specific to the West Midlands. Details of the distribution model were included in the bid submitted by the Managing Agent and, therefore, the selection of their proposal was interpreted as positive endorsement of their plan.

The mechanism almost certainly arose from the custom and practice of allowing managing agents a high degree of autonomy, but the outcome specific to APoC arising from the mechanism was probably unique, because of the particular expectations of scheme designers.

Mechanisms for developing and operating supporting administrative procedures are another example of standard procedures that produced a bespoke output. In this instance, APoC made extensive use of an open access database to control most administrative support processes. The essence of this mechanism was to produce demi-regularities so that all applicants and grant holders were treated in an identical manner, conforming to the expectations of the scheme. Fairness and equity were strong ethical themes in the culture of the scheme. There was unlikely to be significant change to the core mechanism in other contexts, since every initiative required administrative support, but, naturally, changes in detail were likely to arise, dependent on contingent circumstances.

The mechanism for marketing the scheme to innovators was also essential in any support initiative. Again, there were some standard characteristics, such as uniformity in messages communicated to potential participants, but detailed activity changed according to context. In APoC, the Managing Agent employed central coordination to ensure standardisation but also allowed localised implementation, so nodes were able to customise modes of delivery to best suit their local needs. The

mechanism manifested in local nodes taking responsibility for marketing, which also engendered a sense of ownership and attachment to enquirers. Contingent circumstances interfered with the intended launch of the marketing campaign because contract negotiations delayed the start of the scheme and, in practice, covert marketing undertaken by nodes led to an initial 'bubble' of early applications created by demand generated prior to formal introduction of the scheme.

The mechanism for making grant award decisions was bespoke to APoC, although a mechanism serving a similar purpose would, of course, be needed in any context where resources are made available subject to attaining certain standards or meeting a pre-determined specification. In theory, the mechanism designed by the Managing Agent was intended to create a regularity ensuring equitable treatment of all applications, but in practice, while the mechanism did not vary, the decision and decision-making process were heavily influenced by the contextual conditions of the applicant. The mechanism itself was one of the real strengths of APoC and is a strong indicator of the political astuteness of the Managing Agent. It is manifested through sub-regional panels involving independent representation of support specialists, applicant peer group members and technology specialists. It drew heavily on relationship networks developed by scheme partners and had a positive impact on unifying partially competing institutions. To applicants, the mechanism was a signal of the extent to which fairness, independence, and freedom were valued within the scheme. In other contexts there might be many alternative ways in which award decisions could be made, again strongly influenced by contingent circumstances.

The particular way in which the mechanism was manifested in APoC arose from the strong sense of independence and freedom from central interference held by the Managing Agent. They sought, in particular, to demonstrate that grant award

decisions were made openly by a peer-group panel who interpreted the criteria specified in the scheme. It was unlikely that the mechanism could manifest itself in other ways and still achieve the Managing Agent's intention. Even though this was not the only possible method of deciding to whom grants should be awarded, the operation of the mechanism was valued very highly by both participating Enterprises and Scheme Management.

Mechanisms for making the grant available through recovery of sub-contract costs incurred on qualifying activities was another manifestation of a bespoke process that could vary in other contexts. The Managing Agent struck an effective balance between allowing grant holders sufficient freedom to act, whilst simultaneously ensuring control was maintained. Equally, requiring expenditure to be incurred and then recovered ensured that the applicant was committed to the scheme and project, but also ensured that a standard process was not imposed that might create obstacles to progression towards commercialisation. It maintained flexibility and catered for the wide variety of projects that emerged. Another strong feature was that the Managing Agent successfully met the requirements imposed by funding providers, especially ERDF, whilst simultaneously shielding the applicants/grant holder from detailed administrative requirements. Again, there are many alternative approaches to distributing resources and the issue may manifest in entirely different ways in other contexts. The particular manifestation that arose in APoC was entirely due to values exhibited by the Managing Agent and their skill in interpreting and implementing a mechanism to protect grant holders from requirements imposed by external providers perceived as unnecessarily obstructive.

A basic requirement for drawing on public sector finances was the need to operate a mechanism to undertake evaluation of the outcomes arising from the scheme. In APoC, the mechanism was a standard model of conventional evaluation,

predetermining performance indicators and collecting data to measure performance vis-à-vis agreed targets. A obvious weakness was the focus upon predetermined areas of activity with extremely limited opportunity to detect other outcomes. This was the principal explanation for why this research was able to identify outcomes that were not detected by conventional evaluation. Additionally, conventional evaluation was conducted during the operation of the scheme and ceased before most projects had had time to mature fully. It was very unlikely that conventional evaluation could manifest in any other way in other contexts. This research has demonstrated the limitations of conventional evaluation and shows that superior findings would have been achieved if evaluation was implemented in an alternative form, was designed to be implemented from the commencement of the scheme, and was allowed to continue as scheme outputs reached maturity. The manifestation of this mechanism was entirely due to the need to conform to standards laid down in the 'Green Book'.

Closely linked to undertaking evaluation was a mechanism to provide evidence justifying the use of public resources. This was likely to be another manifestation of a bespoke process, but the requirement was standard and unlikely to be found in a different form in other contexts where public resources are deployed. Substantive variation was likely to be found only in the performance indicators selected and whether the funding providers recognised the data provided as evidence of satisfactory outcomes. Performance indicators were determined partly by context that influenced the form of output expected to arise, and partly by the need to meet the requirements laid down in the 'Green Book'.

The final two generative mechanisms operated within enterprises engaged in innovation and commercialisation activity. Whether applying to APoC or remaining fully independent there must have been a mechanism to enable internal funding to be made available for proof of concept activity. Grant applicants were required to make

a contribution of at least one third of the value of the grant sought[491] or to fund the difference between the grant provided and the total project cost, if this exceeded the maximum grant available. Although it was not compulsory for the contribution to be drawn from internal funding, the majority of applicants made use of internal sources, probably for the reasons cited earlier – that it was very difficult to obtain funding from the private sector for proof of concept activity. This mechanism was especially important both pre-APoC, because there were really no alternative sources available, and post-APoC, which mirrored pre-APoC conditions. It was highly unlikely that the mechanism was manifested in any other way in other contexts, although the provision of internal funding was bespoke to individual applicants and varied according to their capital structure and the proportion of funding for the overall project available from APoC.

Closely related were mechanisms for obtaining funding from external private sector providers for proof of concept activity. As already mentioned, this research confirmed that few providers were willing to participate and few applicants were willing to engage with the private sector, because their belief was that rates of return and costs incurred would be extremely high. It might be expected that private sector providers would have assumed high importance, both before and after APoC, but there is very limited evidence of this. The mechanism is not bespoke to APoC and was unlikely to manifest in other ways in other contexts, other than to suggest that higher rates of interest and return might be expected where innovation was perceived to be more risky than 'normal'. Unfortunately, proof of concept activity was evidently perceived as high risk, given the absence of proof of commercial viability.

[491] 25% of the value of the maximum project cost supported by a 75% grant or £30000 grant and £10000 internal contribution whichever is the greater.

5.6.3 - Summary

Structure and structural conditions which influenced the conception, development, and operation of APoC, manifested through strong interrelationships with public sector support provision, through the absence of consistent links with private sector funding providers, and through the strong desire of powerful particulars to improve economic performance across the region, as portrayed in GVA and employment statistics. Manifestation included both indicators of underlying processes and indicators of outcomes arising from processes and results from a combination of standard processes modified by contingent circumstances. The relative balance between standardised and contingent manifestation was difficult to determine precisely, but the greater the influence of following a standardised process, the greater the likelihood of a regularity producing a similar outcome in other contexts. Shortly after APoC came into existence the mechanisms that facilitated close relationships with public sector funding provision changed and it appeared unlikely that an APoC-equivalent scheme could be developed and operated, given contemporary structural conditions.

Powerful particulars had substantial influence on the form and operation of the scheme and it operated successfully because of interrelationships between a series of generative mechanisms. The purpose of each mechanism was generic and was almost certainly replicated in other contexts where similar aims and objectives for supporting innovation were present. However, manifestation was influenced by contingent circumstances producing a particular form that is found only in this specific scheme. For example, whilst all schemes require a distribution system to deliver support, the characteristics of devolved responsibility relying upon collaboration between partners are not known to be replicated elsewhere.

Achieving the ideals of equity, fairness, and uniformity in access and provision across the region relied upon demi-regularities operating in relationships between mechanisms. However, successful operation of the scheme required flexibility and localised decision-making to respond to the variety of applications received and projects supported. Emergent contingent circumstances required some relaxation in espoused procedures to maintain support for certain enterprises.

The particular characteristics of APoC were explained by the interaction that took place between mechanisms driving input and output transactional interdependencies, internal mechanisms that drove the operation, and the enquiry-application-award-grant recovery-outcome chain of causality. Some aspects of these interrelationships were governed by the need to respond to external requirements, such as the conditions imposed by public sector funding providers. However, shared understanding of the challenges facing the region and a common desire to boost innovation and commercialisation through support for proof of concept activity were the principal influences.

6.0 - Conclusions

The fundamental premise of critical realist metatheory (sub-section 2.4 – Critical Realism), the adoption of the principles of abduction (sub-section 3.4.3.1 – Abduction) and retroduction (sub-section 3.4.3.2 – Retroduction) as means of data analysis, and the reflexive role of the researcher/evaluator (sub-section 3.2.2 – Epistemology) in data interpretation, enable contextually specific concluding statements to be made. Conclusions should be viewed within the limitations of the research paradigm and the context within which data was gathered, analysed, and evaluated, but it is recognised that whilst developed from contextually specific research the conclusions may be applicable or have implications for research and evaluation in other contexts. All conclusions reported here constitute a significant contribution to extant knowledge.

Sub-section 6.1 – Enhanced Knowledge of APoC outlines enhanced knowledge of APoC as an intervention, developed through this research by drawing on critical realist metatheory for evaluation of processes. Sub-section 6.2 – Methodological Contributions to Evaluation addresses issues arising from comparing undertaking objectives-based evaluation with the experience of critical realist evaluation embracing critical realist metatheory. Clearly, the direct comparison is between one 'traditional' approach to evaluation and a more contemporary alternative. However, comparison explicitly demonstrates how critical realist evaluation differs from realist evaluation and objectives-based evaluation, both in form and in outcome, and may provide new insights on the appropriateness of using a critical realist research methodology to generate data and information in other styles of evaluation. Certainly, more is known about the adopting critical realism as an underpinning research philosophy in, and the potential for it to add value to, evaluation as a result of this research than was known prior to undertaking this study. For example, this research has highlighted the differences between deductive and inductive inference

arising from widely used positivist and subjectivist research philosophies and inference arising from retroduction in the adoption of critical realism in evaluation, especially with respect to developing plausible explanations embracing hidden mechanisms that transcend the actual and real domains that are not directly observable to an evaluator/researcher. The issues raised may provide guidance for active evaluators, but those choosing to draw upon this research should confirm its applicability to their particular context. Sub-section 6.3 - Summary summarises the key conclusions in the light of the stated research aims and objectives. The outcomes raise a number of questions, some crossing boundaries between conclusions.

Taken collectively, the conclusions confirm the contribution to extant knowledge that has been made by conducting this research. The original contribution made to knowledge of evaluation guided by critical realist metatheory has two principal aspects:-

a) Explicitly demonstrating how critical realist evaluation differs from both realist evaluation and other, more traditional styles of evaluation;
b) Providing an empirical example of the influence of critical realist metatheory on the totality of evaluation processes by undertaking analysis of a specific support intervention for innovation, which has never previously been undertaken and published.

Hence, the original contribution made by this research addresses the gap in extant literature, identified in sub-section 2.3.5 – Alternative Approaches to Evaluation, by highlighting the characteristic differences between realism and critical realism, especially in the context of evaluation.

6.1 - Enhanced Knowledge of APoC

The conclusions highlighted in this sub-section are divisible into two categories and are presented in three distinct, but closely related, groups. The two categories comprise:

(a) outcomes arising from the APoC scheme, particularly outcomes not detected through objectives-based evaluation,

(b) explanations expanding the breadth and depth of plausible causal relationships, extending beyond simple linear determinism.

Ultimately, the conclusions would enable better informed decision-makers to make more appropriate decisions based upon more expansive information concerning plausible influence and likely outcomes. In particular, in contrast to the objectives-based evaluation actually undertaken by Scheme Management, this research highlighted the emergence of unanticipated outcomes (learning); the influence of political dimensions of the Scheme (relationships between nodes, use of collaborative, devolved implementation mechanisms and interdependencies between the Scheme, Managing Agent, and the relevant Regional Development Agency); and the role of generative mechanisms in driving outcomes. Knowledge of these additional findings highlights previously unknown strengths and weaknesses of the Scheme and the explanation for their presence, which enables recommendations to be formulated for APoC and the learning this facilitates may be transferable into other contexts. For example, the design of a second scheme to support proof of concept activity might explicitly address the formalisation of learning achieved as a result of participation.

The first group of conclusions concern the pre-determined performance indicators that were assessed by conventional evaluation (described in sub-section 4.5 – Outcomes: According to Conventional Evaluation). The ratio of enquiries to applications demonstrated the effectiveness of the application process and the

number of positive panel decisions demonstrated successful operation of decision-making procedures.

The researcher interpreted the number of applications as indicative of strong demand for publicly funded support for proof of concept activity. Interviews enabled more details of the rationale for that demand and showed that the form of a grant reduced the inherent risk for successful applicants (for example interviews E15, E19, E23, E24, and E27)[492]. The Final Report, prepared by the Managing Agent, covered objectives-based evaluation focused upon aggregate data. It did not reflect the operating criteria applied within the scheme in detail. For example, tightly defined qualifying criteria were intended, and mostly ensured, that scheme management retained control of the type of applications supported, and the type of activity that would be funded by a grant (SM06, SM08, SM09, E10, and E18). This clearly demonstrates that the form of evaluation undertaken was too myopic and suggests that if it was intended to retain an objectivist ontology for this analysis a decision- and accountability-orientated approach, with its acceptance of, and stronger emphasis on formative evaluation may have been able to provide data and information enabling operating processes to be evaluated. In practice, given that aims and objectives for the Scheme and for the evaluation (sub-section 4.1 – Aims and Objectives) had already been formulated research based on mixed-methods would probably have enabled both processes and outcomes to be considered.

The research undertaken for this thesis provided evidence that BDAs, acting as 'street level bureaucrats' (Mole, 2002, p.182; Lipsky, 2010; Tummers and Bekkers, 2013, p.3-4) interpreted the qualifying criteria more flexibly than was, perhaps, intended (sub-section 5.4.2.2.2 – Explaining the Development of APoC) to ensure

[492] For the sake of brevity no more than five interviews will be cited as examples to confirm the point being discussed and the words 'for example interviews…' will be omitted.

that applications perceived as having potential, but on the periphery of the target sectors, were able to progress to award panel (SM05, SM06, SM13, E22, and E26).

Despite taking a very narrow perspective objectives-based evaluation demonstrated that APoC was successful in achieving pre-determined performance criteria and normally exceeded target. Where a decision-maker simply needs/wants to know whether a performance target has been achieved, then this style of evaluation, which is effectively limited to performance measurement, is adequate. However, it does not help to answer why or how questions and clearly understates performance outcomes.

The second group of conclusions are based upon previous research, not necessarily within APoC, that anticipated outcomes confirmed through evaluation from the perspective of critical realist metatheory. APoC provided financial support to qualifying applicants through an effective application process which aimed to ensure inappropriate enquiries were rejected as early as possible. This allowed support to be concentrated, satisfied due diligence criteria, and proposed projects with perceived commercialisation potential. This research approach underpinned by critical realist ontology demonstrated the effectiveness of the application procedure, as perceived by scheme management (SM01, SM03, SM07, SM09, and SM13). Reactions from enterprises, whilst generally positive, included some negatives comments on specific aspects. Respondent opinions appeared to be influenced by whether the process conformed to initial expectations (E19, E27, and E29 – positive versus E08, E21, and E30 – negative).

Sub-section 5.4.2.2.2 – Explaining the Development of APoC - shows that the decisions (technically recommendations, but always accepted by the Managing Agent) of the award panels were highly regarded because the composition of the

panel was perceived as comprising recognised, knowledgeable experts who treated each application fairly (E19, SM07, SM10, SM13 and SM15). The award of the grant reduced the timescale for taking forward a project towards commercialisation by providing resource flexibility for expenditure decisions to be made, within the limits defined by the criteria for qualifying activities (E07, E10, E12, E13, and E26). It also reduced risks for enterprises by ensuring that qualifying expenditure would be recovered, irrespective of the outcome of the project (E14, E15, E22, E23, and E33).

It is difficult to assess whether APoC helped enterprises become more attractive to external funding providers because the deepening recession depressed the availability of funding and raised the threshold criteria for investment, as perceived by providers. The outcomes arising from proof of concept activity enable better informed decisions to be made, both by those leading the innovation project and those considering investment or making a loan, especially where these offered the potential to further the project (SM01, SM05, E13, E18, and E26).

Proof of concept indicates the likelihood of successful commercialisation and identifies key elements in developing competitive advantage as the project matures. In the event that proof of concept activity demonstrates that successful commercialisation is unlikely, then informed decisions can be made concerning the possibilities available for future development (E12, E16, E22, E28, and E31) or ending the project (E03, E05, E08, E19, and E29)[493]. It was uncertainty in proof of concept activity that increased the difficulty of obtaining funding from private sector investors and which, in turn, increased the need for public funding (SM01, SM05, SM08, E29, and E32).

[493] In this scenario, the enterprise may still survive, working on other existing projects or beginning new initiatives.

Substantively, the evidence compiled from APoC confirms that proof of concept activity yields beneficial outcomes. It was shown to ameliorate risk (SM07, SM09, SM15, E03, and E23) by enabling informed judgements including technical considerations, such as the specification of component parts or bringing in sub-contractors (E13, E16, E21, E22, and E 26), the financial return potential of a target market (E01, E07, E22, E27, and E29), and non-financial benefits that may accrue to the enterprise and to the community (SM08, SM14, E12, E24, and E26)[494]. It would not have been possible to confirm any of these outcomes relying solely upon conventional evaluation.

The important learning that emerges from this analysis is that none of the alternative approaches to evaluation that rely wholly on quantitative data and ignore stakeholder perceptions, opinions, interpretation of meaning and qualitative judgement are capable of capturing the necessary data and underpinning the interpretation needed to provide evaluators with the means to reflect the second group of conclusions (sub-section 2.3.5 – Alternative Approaches to Evaluation).

The third group of conclusions concern issues that were not anticipated and which could not have been identified through the evaluation undertaken. These conclusions were identified only through exploring critical realist metatheory as a foundation for evaluation. The particular characteristics of APoC helped to ensure that individuals and enterprises with innovative ideas and the potential to satisfy the grant award criteria were provided with the opportunity to gain experience at a relatively low level of personal exposure and risk[495].

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[494] In this specific example, the fact that APoC was a grant directly enhanced the financial return potential of the innovation project by reducing the amount of investment that needed to be recovered or amortised across the life of the project.

[495] The opportunity to gain experience and achieve learning was not open to everyone, since it was necessary, officially, to show that the innovation project for which you wished to apply for a grant fell within the target sectors.

Irrespective of the eventual outcome, the evidence drawn from adopting critical realist metatheory demonstrates that proof of concept activity generates learning for those involved. The learning achieved ranges from technical or scientific learning (E10, E17, E23, E29, and E33), through to business and commercial learning (E01, E02, E09, E21, and E30) and, in this intervention, the requirements for making an application for public grant funding (E02, E05, E07, E20, and E23). Outcomes arose because involvement in APoC provided a learning experience for the technologist who had comparatively little familiarity with business (E01, E02, E11, E13, and E27).

Involvement in APoC enhanced morale, motivation and the drive towards commercialisation (E04, E10, E13, E28, and E32). This was partly due to receiving financial support (E01, E20, and E30), but also because the award panel was perceived as comprising 'experts' and their positive decision to award a grant was regarded as confirmation that the project was likely to succeed (E18, E23, and E28). After an initial dip even applicants whose application was rejected experienced increased motivation (E03, E05, E08, and E19), if only to demonstrate that their innovative project did have merit. Morale and motivation were boosted because Enterprise interviewees perceived support and encouragement from individuals and agencies able to provide meaningful assistance (E16, E19, E28, E30, and E32). The communication between applicant and scheme is an example of Spence's signalling theory (1973) and demonstrates the constituent elements outlined by Connelly *et al.* (2011, p.52).

The support received was perceived as confirming that the projects being undertaken were regarded as significant, with the potential to contribute towards economic development within the region (E04, E13, E20, E22, and E32). This reinforced self-belief and helped to articulate recognition of contribution to regional development. It was also status-enhancing, as working in business was perceived as important in

society. Nevertheless, the precise nature of outcomes experienced and benefits achieved varied between applicants.

Moving on to conclusions concerning explanation, the analysis in sub-section 5.4 – Stage Four - Retroduction highlighted five factors particularly influential in the development of APoC:-

a) Belief in a positive association between innovation and economic development, growth and prosperity;
b) Comparative economic underperformance of the West Midlands;
c) Desire for innovation amongst both support service providers and enterprises;
d) Commitment to providing publicly funded early-stage support for innovation to fill a recognised gap caused by the market failure in privately funded suppliers;
e) Need to demonstrate proof of concept early in the process of commercialisation.

APoC was created because senior staff in regional support institutions recognised economic underperformance in the West Midlands (SM01, SM06, SM07, SM09, and SM10). They shared a commitment to raising the gross value added by regional companies and increasing wage levels to enhance economic activity (SM02, SM03, SM06, SM08, and SM12). Additionally, they shared a belief that innovation was linked positively with economic development, growth, and prosperity and that improving economic performance required more innovation. Their experience indicated that an obstacle to innovation was the dearth of funding available to support early-stage projects with commercialisation potential (SM01, SM04, SM05, SM11, and SM15)[496]. Since key stakeholders all had experience of public sector support, they had a natural desire to overcome this obstacle by using public resources.

[496] This was attributed to a failure of the market for private funding caused by private sector funding providers' reluctance to accept the risks associated with supporting proof of concept activity needed to substantiate commercialisation potential.

Adopting Danermark *et al.'s* explanatory framework (2002, p.109-111) revealed eight key components and the mechanisms creating interrelationships, which explain the form taken by APoC and its *modus operandi*. These were:-

a) Collaboration between potentially competing support providers;
b) Experienced Managing Agent able to develop and operate effective and efficient administrative procedures;
c) Access to public funding for proof of concept activity;
d) Successful targeting of sectors yielding high growth potential innovations;
e) Effective application procedure;
f) Region-wide access to the scheme;
g) BDAs providing reasonably uniform provision, despite localised interpretation of progression criteria;
h) Composition and function of the award panels.

APoC took the form it did because senior staff in regional support institutions, working with the Regional Development Agency, drew up a specification for a scheme they believed would satisfy their aim to assist growth in the region by providing public sector support for proof of concept activity. It was necessary to appoint a Managing Agent to finalise operational procedures and oversee implementation, because none of the key stakeholders had sufficient resource or experience at an operational level to undertake these duties (SM01, SM02, SM04, and SM06). The Managing Agent designed a process that accommodated issues such as the designation of target sectors with high-growth and innovation potential, a devolved distribution model providing relatively even coverage across the entire region, effective and efficient administrative procedures, and a sense of impartiality for both collaborating provider institutions and applicants (Section 4.0 – APoC Scheme).

The conclusions arising from APoC highlight a number of strengths and weaknesses of the Scheme which, had it remained in operation would have provided the basis for recommendations for future operational change. Additionally, the recommendations may also provide guidance to those designing and managing similar schemes in other contexts, although the applicability of the recommendations to other contexts would need to be ascertained. The recommendations include:-

a. Ensure the design of the Scheme meets the specific needs of a targeted group of participants within the community. This was a major strength of APoC built on the experience of the scheme designers;
b. Operate a devolved implementation policy allowing local interpretation within defined parameters. For APoC the role of BDAs closely mirrored this and was another major strength;
c. Build on a devolved management style to facilitate collaborative operations between partners. Nodes regarded being part of the APoC network as a privilege and worked in close cooperation to deliver an integrated service to applicants;
d. Specify focused qualifying activities. This ensured that APoC contributed directly towards its target outcome – facilitating commercialisation of innovative new products and services;
e. Limit available grants to ensure a meaningful independent contribution from applicants. This helped engender commitment from grant holders towards complete projects satisfactorily and within reasonable time scales;
f. Provide an integrated package of funding and support to assist applicants as required. This needed boosting within APoC because not every BDA or node was equally effective at identifying and sourcing support to meet the needs of grant holders. It also led to some prioritisation of cross-selling with nodes seeking to offer their own particular specialist services to a relatively captive market;

g. Peer-group assessment and award is desirable but may lead to difficulties with confidentiality and hence, APoC's use of assessment by independent peers proved to be an effective compromise. This ensured that awards could not be influenced by Scheme Management and emphasised the openness and egalitarianism underpinning the award decision process;
h. Allow some flexibility post-award in the event of changing context. This was valued very highly by participants who were able to adjust their implementation plans with support from the Scheme;
i. Undertake on-going evaluation based on critical realist research philosophy and methodology to broaden the scope of findings, explanations, and outcomes. If implemented on an on-going basis it also provides the opportunity to identify when further support is required by a participant. Absence was a major weakness for APoC;
j. Ensure there are links to appropriate follow-on support funding and advice schemes drawing on the application to APoC and performance in achieving grant aims to justify the need for further support. This was a major weakness for APoC and was the source of dissatisfaction for applicants.

The knowledge of APoC that emerges from this research is a clear indication that where research underpinned by critical realism provides data for evaluation activity, there is the potential to generate wider causal insights into a wider range of aspects of the intervention, especially in terms of explanations of causality, than other styles of evaluation activity will allow. Of course, the specific findings emerging from this research with respect to APoC are contextually specific to the Scheme, but may communicate implications and learning into other contexts. However, it seems apparent that replacing the objectives-based style of evaluation undertaken by Scheme Management with any older, traditional style would result in similarly myopic outcomes, albeit that perhaps different features and characteristics of the Scheme

may be highlighted. An approached underpinned by critical realism is not necessarily the only approach that might overcome the problems and difficulties arising from reductionist analysis. However, it's foundation seeks more expansive outcomes, closer to the reality in which the Scheme operated. It does, however, introduce more complexity and dynamism into the analysis (sub-section 3.4 – Empirical Activity).

Finally, the enhanced knowledge of APoC emerging from this research illustrates the importance of maintaining a focus upon plausibility rather than possibility in explanation. Fundamentally, a possible explanation is one that could account for whatever is being explained whereas a plausible explanation is likely to provide an account. The relationships between possibility, probability and plausibility are subtle and, especially as used in everyday language *"…"imprecise" uses in everyday language have led to a situation in which our three qualifiers can (almost) be used interchangeably."* (Helm, 2006, p.18). Possibility concerns a potentially realisable outcome that can be challenged on the grounds of either absolute or contingent (relative) reasons. Probability concerns likely occurrence and typically leads to an ordinal ranking of possibilities ranging from most likely to least likely, based on subjective judgement relative to the aims and objectives of the evaluator. By default, a probable outcome must also be a possible outcome. Plausibility concerns the structure of the argument put forward in justification based on convincing, credible argumentation. Outcomes can be plausible but not necessarily possible (Helm, 2006, p.26). The critical point that Helm makes is that whilst used interchangeably, there are, in fact, important differences which ought to be explicitly highlighted in the context of any evaluation studies.

Conventionally, possibilities are listed and assessed by attaching a probability of occurrence but plausibilities include subjective assessment too. Additionally, possibilities are commonly expressed as single entities whereas plausible

explanations are expressed as linked mechanisms and influences. Often multiple plausible explanations are provided, which are not mutually exclusive and the principles of equafinality and multifinality often apply in open social systems (Melin *et al.* 2013, p.50). Nevertheless, neither a possible nor a plausible explanation may be accurate – both may be fallible, although fallibility is recognised more strongly with respect to plausible explanations; attaching probabilities to possible explanations appears to give the illusion of an accurate assessment irrespective of how probabilities may be determined. Hence, in recognising fallibility, plausible explanations are regarded as working towards the most likely available explanation which, in the particular instance of evaluating social programmes provides the 'best' available explanation (as judged by the evaluator or other user) that can be relied upon for decision-making and advice purposes. Even with attached probabilities, possibilities can include some highly unlikely explanations, explanations which do not have the credibility or believability that a plausible explanation may have. However, as always the acid test of any alloy is fitness for purpose and the evaluator seeks explanations that are workable and useful within the context of the purpose for which the explanation is required, even if fundamental veracity cannot be demonstrated.

6.2 - Methodological Contributions to Evaluation

This thesis has drawn upon a wide perspective of evaluation and has not simply focused upon the methodologies and processes used in evaluation. Although there are close relationships between research and evaluation the two terms are not synonymous and cannot be used interchangeably. Research is a facilitation mechanism to the activity known as evaluation – *"Evaluation is, after all, applied*[497] *research."* (Pawson and Tilley (1997, p.214). Evaluation is the activity arising from the decision to use the information generated by research to influence aspects of

[497] Emphasis by underling replaces emphasis by italics in their original document.

social programmes – including any aspect in which decision-making informed by evaluation may enhance programme effectiveness and/or efficiency. This embraces formative and summative evaluation, decisions made at any point in the design, development, testing, implementation, and operation of an intervention/programme, and in assessing the merit, value, and worth of outcomes. Critical realism is not, in itself, an empirical approach to research; rather it is a research philosophy (sub-section 2.4 – Critical Realism). It, therefore, has implications for all aspects of research from research design, to data collection, data analysis, data interpretation, and research evaluation. Fundamentally, critical realism impacts most strongly on data interpretation which, in the context of this thesis, manifests in developing explanations of causality and the outcomes arising from interventions.

The conclusions highlighted in this sub-section are divided into four groups covering:-

a) The aims of evaluation and methodology;
b) Methodology in conventional/traditional evaluation;
c) Methodology in evaluation from the perspective of critical realist metatheory;
d) Lessons learnt from conducting this research;

6.2.1 - Aims of Evaluation and Methodology

The aim of APoC can be summarised as changing the conditions in which grant recipients were able to carry out proof of concept activity, with the expectation of consequent progress towards commercialisation, and the accrual of benefits for the enterprise and the region. Evaluation should have been undertaken using a methodology that embraced not only performance measurement, but assessed the effectiveness and efficiency of the scheme with a view to, where necessary, recommending positive amendments for implementation, either in the existing scheme or a follow-on. A utilisation-focused approach should have facilitated this (sub-section 2.3.5 – Alternative Approaches to Evaluation). Since it is extremely

unlikely that evaluation, and any subsequent amendments, can benefit all scheme stakeholders equally, evaluation should have indicated where benefits are likely to emerge and where stakeholders are likely to be affected detrimentally.

However, the aim of the evaluation actually undertaken by Scheme Management (covered in sub-section 4.5 – Outcomes: According to Conventional Evaluation) was limited to justifying the receipt of public resources to finance the scheme. There was no explicit indication of any intention to broaden evaluation beyond key performance indicators. Similarly, the Final Report did not explicitly indicate any intention to seek explanatory causal relationships, or to deepen understanding of the scheme beyond direct observation.

Much of the literature on evaluation in social science concerns evaluating social programmes. The majority of reported examples arise in education, nursing, social work, criminology, and welfare. Conventional/traditional evaluation of social programmes makes extensive use of econometric data and randomised control trials, while realist synthesis is often used as a form of meta-evaluation. APoC as a single intervention was nested within Government Support Policy for enterprise and was designed to contribute to change in specifically targeted individual enterprises. It differs from social programmes because it was not designed to induce change across a whole category of enterprises in society (sub-section 4.1 – Aims and Objectives). Evaluation methodology must reflect the characteristics of the intervention being evaluated and, as this research demonstrates, the methodology of evaluation, the choice of specific forms of data collection, analysis, interpretation, and evaluation tools, and techniques, must also reflect the aims of the evaluator.

6.2.2 - Conventional Evaluation

Conventional evaluation focuses on the pre-activity establishment of performance targets and the post-activity assessment of whether these targets have been achieved (sub-section 2.3.2 – Purposes of Evaluation)[498]. Although there are several different styles that can be considered broadly 'conventional' (see sub-section 2.3.5 – Alternative Approaches to Evaluation) they all share a common foundation based on a limited form of performance measurement, because evaluators pre-determine the areas or issues for investigation, pre-define measures of acceptable performance, and then seek data and information that can confirm or refute performance attainment vis-a-vis the pre-determined acceptable standard. In essence, each approach differs only to the extent to which the underpinning (usually) objectivist ontology and research methodology is focused upon delivering data and information concerning different, but pre-specified aspects of the intervention. Actual evaluation activity hardly differs and is grounded in a process of making comparative judgements of actual outcomes achieved versus pre-specified target in the light of pre-determined acceptable performance levels. The style of evaluation selected by the Managing Agent responsible for APoC conformed with this perspective and appears to have been strongly influenced by a desire to conform to 'Green Book'' principles, coupled with the need to provide performance data to justify receipt of public resources (sub-sections 5.6.1 – Structure and Structural Conditions and 5.6.2 – Generative Mechanisms).

Methodologically, objectives-based evaluation in APoC accords with the hegemony of positivism and quantification and conforms to Danermark *et al.'s*. (2002, p.165) extensive research design. Data was gathered solely by self-completed

[498] Typically, conventional evaluation focuses more upon effectiveness – have the required outcomes been achieved? – than efficiency – have the desired outcomes been achieved in the most resource-effective manner?

questionnaire, in which participants' self-reported quantitative measures of their achievements. No attempt was made to triangulate the data reported, nor confirm a causal link with the scheme. In common with other generic forms of conventional evaluation, this was based on an assumption of a 'flat reality' reducible to observable events and limited to considering 'facts', i.e. observable characteristics that are detected through sense data. Any attribution of causality was based on Humean constant conjunctions (Hume, 1775/1975) with evaluation creating large quantities of data from which to draw comprehensive generalisations. This might have some value where evaluation and subject initiative occur in a uniform, closed environment, but such circumstances never occur in the social world outside a scientific laboratory.

Conventionally, the measures of performance adopted for this category of evaluation tend to be very similar, if not identical, from evaluation to evaluation, with minor 'customisation' to reflect contextually specific characteristics. However, the performance measures developed for APoC and the criteria for interpretation reported in the 'Final Report', are entirely general. Although no direct comparison was made here, extant research suggests that identical measures would be found in the evaluation of many similar enterprise support programmes linked with innovation. Confirmation would indicate that conventional evaluation is a-contextual, tending towards standardisation.

Evaluation approaches in the conventional categories - Quasi-evaluation Studies and Improvement and Accountability-Orientated Evaluation (see Table 1) - do not generally seek explanation for performance attainment, nor to enhance understanding of causes, and does not seek data or information beyond the limits defined by predetermined areas (sub-section 2.3.2 – Purposes of Evaluation). If an outcome is not anticipated and performance indicators are not defined to reflect expectations, then the outcome is, at best, ignored and probably arises without even

being noticed. Undertaking conventional evaluation can contribute towards wider assessment, but is limited more by the actions undertaken by evaluators than any methodological shortcomings. Hence, some forms of conventional evaluation have been extended to seek causal explanations. No evidence was found to suggest the intention to use conventional evaluation in APoC for any purpose other than justifying receipt of public sector funding. It is not known whether early closure without a follow-on scheme in place, deflected the Managing Agent from carrying out further analysis.

Typically, conventional evaluation approaches adopt a linear process of investigation. They do not privilege a particular ontology and may be found in both idealist and realist paradigms. They assume causality arises from direct (linear?) succession. Objectivism and positivism dominate methodology, especially in data interpretation, and normally, a quasi-experimental design is adopted, involving classical empiricist approaches, such as pre-test versus post-test comparisons and benchmarking against control groups. Evidence is developed through experimental replication to establish regularities and produce consistent outcomes. The evaluation of APoC regarded the scheme as a series of individual applications, assessed against standardised criteria, and aggregated data across applications processed within the scheme. The 'Final Report' does not address the specific context of any individual application and the only perspective taken is across the entire scheme.

A key influence in conventional evaluation approaches is the intention of the evaluator, here the Managing Agent. It is they who determine what is being evaluated, the measures adopted, and the criteria used to determine outcomes, accepting that where public resources are used, there is an expectation that 'Green Book' principles will be applied. Some conventional evaluation approaches emphasise rigid conformity to prevailing knowledge and opinion, whereas others

recognise relativism. Hence, in accepting the selection of a narrow range of tools and techniques for conducting evaluation some approaches emphasise quantification, whereas others place more stress on qualitative data. There is no evidence of the Managing Agent of APoC making a selection from a range of available alternative paradigms, methods, and techniques for conducting different forms of evaluation. Clearly, the hegemony of realism, objectivism, and positivism dominated decision-making. Consequently, the Managing Agent selected a self-completed questionnaire as the principal data gathering instrument, chose simple frequency analysis, and decided to interpret the data as a direct reflection of observable reality. The more the approach leans towards positivism, the greater the emphasis on confirming decision-maker aims and objectives and rational outcomes; this appears to summarise evaluation activity inside APoC. Constructivist approaches place more emphasis on empowering stakeholders to 'own' the intervention, but there is no evidence of this being intended for APoC participants.

Evaluation enabled the Managing Agent to provide a numerical description of some of the outcomes arising from the scheme. While this may be sufficient to make a straightforward judgement of satisfactory performance vis-à-vis predetermined targets, and might be helpful in justifying the use of public resources in APoC, conventional evaluation offered very little towards understanding of why performance targets had been achieved, which particular aspects of the scheme were most efficacious, or explaining how the scheme actually operates. The following sub-section 6.3.2 shows how this research differed from the style of evaluation undertaken by Scheme Management and confirms findings that explain how the scheme operated. It demonstrates that the evaluation undertaken by Scheme Management understated actual achievement and explains which aspects of the scheme were influential in determining performance.

6.2.3 – Evaluation Grounded in Critical Realist Metatheory

The earlier comments in sub-sections 6.2.2 – Conventional Evaluation have concentrated upon the alternative styles of evaluation that are typically regarded as 'conventional'. In this research a principal interest is in differentiating evaluation based on critical realism and the approach known as 'realistic evaluation', which is based on realism. The approach to evaluation based upon critical realism explored in this research extends the realistic approach as summarised in Table 10 – Realist and Critical Realist Approaches to Evaluation. Defining rules and attempting to segment issues into structured associations rather detracts from the essential feature of both realistic and critical realist evaluation – both are holistic with issues and processes combining in dynamic configurations pertinent to the focus of the evaluation. Both seek understanding and explanation with critical realism offering a broader and deeper understanding with the potential for enhanced decision-making. The latter cannot be guaranteed to arise from either approach since the actions of decision-makers using the information and understanding generated from evaluation are entirely independent of evaluation activity. Engagement with decision-makers during evaluation processes, irrespective of the approach adopted in likely to induce higher levels of acceptance and more purposive use of evaluation outcomes.

Critical realism can influence both formal and informal evaluation. This research has focused explicitly upon formal evaluation[499] and has given only implicit consideration of informal. Informal evaluation is an essential factor influencing judgement, including judgements made in designing and implementing formal evaluation activity. Judgement is typically used as an element in formal evaluation, for example, by the Managing Agent, the evaluator, to determine what level of performance vis-à-vis pre-determined performance indicators is regarded as acceptable. Reflecting the central tenet of methodological pluralism, judgement has also been exercised by the

[499] The purposeful attempt to assess, explain, and understand social phenomenon using robust, systematic and valid methodological forms of data collection, analysis, interpretation and evaluation.

Table 10 – Realistic and Critical Realist Approaches to Evaluation

Realistic Evaluation		Critical Realist Evaluation	
Issue ('Rule')	**In Action**	**Issue**	**In Empirical Practice**
Generative Causation	Understanding the conditions required to cause change	Causation	Identifying and explaining interrelationships between influencing factors that trigger generative mechanisms
Ontological Depth	Need to penetrate surface observable inputs and outputs (Later rejected by Pawson, 2013, p.61-71)	Depth Ontology	Identifying and explaining chains of causality that extend beyond phenomena detectable in the empirical domain including elements of the active and real domain
Mechanisms	Understanding interactions between mechanisms giving rise to regular patterns of behaviour	Generative Mechanisms	As defined in sub-section 2.4.2 – Generative Mechanisms; a mechanism giving rise to outcome
Contexts	Understanding social situations in which mechanisms operate	Background context; Necessary and Sufficient conditions	Explaining the influences that enable mechanisms to operate and interrelationships between constraining and facilitating mechanisms
Outcomes	Understanding what outputs are produced and how they arise	Outcomes	Explaining multiple outcomes and interrelationships between influencing factors
CMO Configurations	Develop transferable and cumulative learning by abstracting CMO configurations and developing propositional statements	Plausible Explanation through Inference	Using inference to develop plausible explanations of how and why outcomes arise
Teacher-Learner Processes	Engage stakeholders to test hypothesised CMO configurations	Meaning	Identifying meaning through induction and explaining how meaning shared amongst stakeholders influences mechanisms and outcomes
Open systems	Acknowledge uncertainty arising from dynamism in interactions	Social World	Recognising fallibility complexity

researcher, in selecting approaches to data gathering, analysis, interpretation, and evaluation that build upon the fundamental principles of critical realist metatheory. Equally, given the limited scope of this research, judgement has been exercised in choosing to emphasise aspects of the findings that are comparable with specific aspects of evaluation, accepting (somewhat regretfully) that there are many outcomes from critical realist evaluation of APoC that lie outside the remit of this research (see final point in this sub-section).

Critical realist approaches, especially in formal evaluation, emphasise the primacy of explanation and understanding. Although the Managing Agent did not seemingly intend to deviate from performance measurement to justify receipt of public resources, methodological pluralism at the heart of a critical realist approach embraces the possibility of fulfilling that intention and, as this research demonstrates, would have provided additional useful information to strengthen the justification. It would have provided evidence to enable better informed decisions in developing a strategy to respond to the enforced demise of the scheme.

The principal distinguishing feature of critical realist evaluation lies in moving between observation and outcome (sub-section 3.4.3 – Data Interpretation). It takes a fundamentally different view of data interpretation, based upon abduction and retroduction as modes of inference indicating plausible explanations, in contrast to either conventional or realist styles of evaluation that favour deduction and induction as modes of inference indicating causal determination. Consequently, the form of evidence required differs. In critical realist evaluation evidence is regarded as the best available form of explanation, irrespective of whether cause and effect can be determined and confirmed empirically through sense data. Explanation is, therefore, inevitably fallible, but is dynamic and may be enhanced at any point as insight increases. Evidence is predicated on the issue ‘what must be present for x to occur’,

irrespective of whether detectable or observable by sense data. Other forms of evaluation typically accept only evidence wholly determined and confirmed empirically through sense data, but, as has been demonstrated by comparing Section 4.0 – APoC Scheme and Section 5.0 - Findings, the evaluation of APoC undertaken by Scheme Management was unable to explain its existence and operation, whereas even the limited critical realist evaluation conducted by the researcher was able to do so.

In practice, critical realist evaluation is an extension of realist evaluation and shares a number of ontological, epistemological, and methodological features (sub-section 2.3.5 – Alternative Approaches to Evaluation). The fundamental points of agreement include generative causality, the stratified nature of reality and the role of mechanisms in explanation: however, critical realist evaluation differs substantially. This poses the principal methodological challenge for an evaluator seeking to undertake an evaluation grounded in critical realist metatheory. When developing their approach, the evaluator must recognise that critical realism is a metatheory applicable to many different empirical strategies and therefore offers the potential to generate new insights when allowed to underpin almost any style of evaluation. Consequently, the evaluation of APoC already undertaken would not be replaced by a critical realist approach, but would be extended and supplemented to provide a more comprehensive understanding and explanation; more comprehensive than can be discussed, explained, justified and presented in this limited research project.

The methods normally advocated in realist evaluation share, with many other (earlier) styles of evaluation, a bias towards objectivity, positivism, and quantification. Critical realist evaluation does not exhibit this bias and favours qualitative methods, which chimes with understanding reality as mediated by personal and collective understanding and social action. The data gathered during the evaluation

undertaken by Scheme Management would have provided a suitable starting point for realist evaluation, having made use of basic questionnaires returning numerical data. To a limited extent that evaluation could have been expanded. However, it seems likely that, at best, the Managing Agent would have simply added extra performance measurement indicators to guide the collection of extra quantitative data, which would have been assessed and interpreted using exactly the same conventional evaluation techniques, and with the same 'flat' ontology. Moving towards a realist or a critical realist evaluation required a different ontological, epistemological, and methodological approach, especially in data interpretation and in the actual activity of pure evaluation rather than in data collection and analysis, whilst still reflecting the points of agreement highlighted above.

Realist evaluation advocates a pluralist view of methodology whilst in critical realist evaluation, methodological pluralism is essential. The major differences between realist and critical realist evaluation lie principally in data interpretation and the scope of the potential findings that can be justified by the evidence reproduced here. In realist evaluation, data interpretation remains 'flat', despite some acceptance of stratification in reality, where stratification refers to individual action being embedded within a wider system of social processes. Consequently, stratification influences realist evaluation primarily in terms of recognising only relationships that can be observed and interpreted through sense data and visible outcomes. In the conventional evaluation of APoC relationships between the scheme and visible outcomes, such as progression towards commercialisation, were the only relationships recognised.

Critical realist evaluation fully embraces depth ontology (sub-section 2.4.1 – Domains and Strata) in recognising emergence and causal relationships transcending adjacent strata in reality. This poses the fundamental methodological challenge for critical

realist evaluation; how can the evaluator access unobservable, hidden causal influences lying beyond the domain of the empirical, hidden below the experiences stratum? Exploring critical realist evaluation with APoC, researched here, demonstrates some of the possibilities that were perceived, whilst indicating several that could not be pursued, given the scope of this research project.

Critical realist evaluation is best suited to addressing 'why' and 'how' issues, rather than simply answering 'what' questions (sub-section 2.3.4 – Evaluation and Research). Consequently, in this research critical realist evaluation built upon conventional evaluation, which described what APoC achieved towards providing a limited understanding and restricted explanation of why the scheme was developed, how it operated, and why it produced the outcomes that it did. Understanding and explanation in critical realist metatheory differ substantially, compared to both conventional and realist evaluation. Emphasis is placed upon contextually specific theoretical explanation NOT the type of generalisation that is assumed to apply universally and that may be derived from statistical data. If any generality is evident, it will be transfactual, NOT empirical or actual, and will, consequently, NOT be directly observable or detectable. Consequently, understanding and explanations provided in this research are not comprehensive and are necessarily contextually specific to APoC. The outcomes cannot be considered representative of any, characteristic, or issue that may be found in any other support initiative, irrespective of how closely another initiative mirrors the aims, objectives, and operations of APoC.

However, whilst critical realist research cannot contribute to statistically based meta-analysis applying a form of either 'reflective practice' (Schön and Rein, 1994) or 'critical interpretive synthesis' (Dixon-Woods *et al.*, 2006) would allow independent evaluation studies to be combined to enhance understanding of any tendencies or commonalities that appear to be found in certain contexts. Essentially, it remains

true that qualitative studies can never be anything other than situationally specific. However, if it is possible to develop an approach that takes into account similarities in ontological and epistemological assumptions, and the methodological approach taken is iterative rather than linear, then sufficient proximity may exist for integration of the results from independent studies to be combined. The combined outcomes may be useful to guide others and to safely assume transferability, within reasonable, acceptable limits. Nevertheless, methodologically congruence can never be proven absolute and outcomes must be regarded as a pragmatic attempt to draw on learning from a wider range of studies, but never a 'certain' result. In the case of qualitative aspects of critical realist research underpinning evaluation, outcomes should never be considered to confirm regularities, only tendencies which may sometimes be exhibited when certain contextual influences are present.

As this research has demonstrated, a critical realist approach to evaluation, whilst accepting plurality, requires a particular, thoughtful approach to data interpretation grounded in much more than simply applying particular tools and techniques. It emphasises the importance of judgements made by the researcher/evaluator in selecting approaches to data collection and analysis as a facilitator of data interpretation. The research was based upon a multi-method foundation, combining both extensive and intensive research designs and clearly reflects the fundamentals of methodological pluralism that lie at the heart of the practical application of critical realist metatheory. Section 3.0 - Methodology explains how and why elements of data gathering and analysis reflect modified versions of tools and techniques that could easily be found in more conventional forms of research and shows why the approach selected was considered the most suitable choice in this context.

The distinctive feature of this research is the application of the principles of abduction and retroduction, as forms of inference over deduction and induction. As sub-section

5.3 – Stage Three – Abduction / Theoretical Redescription shows, abduction is concerned with recontextualising mechanisms thought to be characteristic of the scheme. Retroduction (sub-section 5.4 – Stage Four - Retroduction) focuses upon possible mechanisms not confirmed as real in empirical terms, but which provide plausible explanation. Collectively, the two move towards demonstrating what had to be present in order for APoC to exist and function as it did. Interpreting data using abduction and retroduction explicitly enabled the interaction of mechanisms to be explored, thus highlighting the possibilities of multiple explanations of the outcomes identified.

6.2.4 - Lessons from this Research

What has been learnt from this research, especially in the context of the advantages and disadvantages of underpinning evaluation with research based upon critical realism? This research has added substantially to extant knowledge concerning the value which critical realism can add to evaluation. The points summarised in this sub-section highlight the learning arising from conducting this research. In broad terms, older forms of evaluation tend towards a much narrower focus on issues and performance indicators pre-determined by key stakeholders to the evaluation. More contemporary approaches, including those underpinned by critical realism recognise a wider focus, embracing stakeholder participation, and being grounded in enhanced research methodologies, are capable of delivering more sophisticated data for the evaluation activity (sub-section 2.3.5 – Alternative Approaches to Evaluation). Approaches such as those underpinned by critical realism reveal the complexity and dynamism of influences affecting an intervention with the consequent difficulty of identifying and understanding the mechanisms that act causally to condition operations and create outcomes. For example, critical realism cannot confirm the existence of regularities but does demonstrate tendencies. The implication is that critical realism needs to be able to differentiate between when mechanisms are

triggered and when those mechanisms are influenced by other mechanisms, such that the particular combination of mechanisms that sometimes produces an outcome but sometimes does not, can be understood and incorporated in plausible explanations (sub-section 2.4.2 – Generative Mechanisms).

Older approaches to evaluation regard explanation as linear causality that can be extended into prediction. Predictions are viewed as 'certain' because linear causality does not break down and is not influenced by other mechanisms. However, experience demonstrates that predictions are not certain. Critical realist forms of evaluation present causality as a much more complex phenomenon which, through inevitable fallibility, cannot provide predictions, but can indicate plausible possibilities.

In APoC, the Managing Agent's original intention, that conventional evaluation would take place after the scheme had closed using data gathered formally as each individual project was completed, recognised none of the potential uses, or alternative forms, of evaluation. He, and the consequent evaluation were unable to recognise aspects of the scheme that could have been applied in the development and operation of APoC. There is no evidence to suggest that alternatives were considered and rejected in favour of perceived strengths of conventional, post-ante evaluation. Similarly, in developing the evaluation actually conducted, there is no evidence of any intention to consider outcomes beyond the range of pre-determined key performance indicators. Only extremely limited opportunities for participants to make freehand comments, whether focused upon the designated performance indicators or addressing wider issues, were provided. The motivation for evaluation sprang only from the need to justify the use of public resources which, in turn, constrained the focus to simply performance appraisal, rather than understanding and explaining operating activity and outcomes. Objectives-based evaluation was NOT used to make causal associations, to develop predictions, or to forecast

outcomes – it is not designed to do so. Relying solely upon objectives-based evaluation missed opportunities to identify all outcomes and amass information useful for supporting scheme enhancement decisions. Observing the experience of evaluation shows that it is not sufficient to follow an approach to evaluation dictated only by an external funding provider, or other stakeholder. It is always necessary to carefully consider how evaluation can provide information useful to the management of the intervention and to select eclectically from the range of alternatives available to design an evaluation process underpinned by research that recognises the possibility of unforeseen outcomes.

All the original data collected explicitly for exploring critical realist evaluation was gathered retrospectively and relies heavily upon surviving records that were not compiled with the explicit purpose of conducting this research. All interviews were conducted after closure and depended upon interviewee recall and verisimilitude of their interpretation. Analysis of interviews and surviving records took place after most projects had either run their course, or were suspended pending the acquisition of further resources. Retrospective data collection carries with it risks of data distortion, either deliberate or accidental, and subsequent analysis and interpretation must seek to minimise the consequences of this and reflect possible distortion in any conclusions drawn. This shows that irrespective of the evaluation style intended, the approach used during the underpinning research is not immune from the typical pitfalls and problems associated with conducting research of that type (sub-section 3.3 – Research Design).

As this research unfolded it became clear that conducting a critical realist evaluation after an intervention has closed limits opportunities for both evaluator and participants. There is no formal record of evaluating anticipated or predicted outcomes prior to the design and implementation of the APoC scheme. It is likely

therefore, that any pre-scheme evaluation was informal and limited to individuals or small groups. Evolving experience indicates that where the intention is to conduct a full evaluation founded in critical realist metatheory, the processes should be 'designed in' from the inception of the scheme[500]. This would enable informal, or formal, pre-scheme evaluation to be conducted using some of the techniques associated with abduction and retroduction, such as counterfactual argumentation or thought experimentation, as a means of developing a rationale that may provide a plausible explanation of why desired outcomes are achieved. More significantly, critical realist evaluation extends the focus beyond mere performance appraisal and encourages the evaluator(s) to develop a mentality of seeking explanation and understanding in addition to performance measurement. Data gathering, analysis and evaluation that takes place as the scheme is implemented enables outcomes and conclusions to be reached 'in real-time', whilst the scheme is still in operation. This provides the opportunity for better informed evaluators to make recommendations that can be incorporated into the scheme immediately, in addition to providing information to assist the design and operation of future schemes.

The experience of conducting this research suggests that data gathering should take place regularly, not less than every three months, with each applicant and grant holder. It is imperative to include a formal commitment to participate in data gathering as a condition of participating in the scheme. Equally, it is important to gather data from applicants during the application process, because learning outcomes begin to emerge immediately on initial contact with the scheme and useful feedback can be gained to help maximise positive outcomes, even if an application is ultimately not successful.

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[500] Ideally, evaluation should be designed in from inception, irrespective of the choice of style of evaluation.

This research was based upon a quasi-mixed-method approach as the basis for critical realist evaluation. Typically, the evaluation team would either design all elements pre-scheme or would start out with an intention to employ a mixed-method approach and select from an eclectic range of individual elements as the work develops. However, in this research the researcher inherited a situation where conventional evaluation was already underway and there did not appear to be any intention to gather qualitative data. The researcher injected a mixed-method approach by adding questions that required qualitative answers into feedback questionnaires that initially focused upon gathering quantitative data for performance measurement and followed this with semi-structured interviewing. Semi-structured interviewing is an appropriate method for gathering data, but, as indicated in sub-section 3.3 – Research Design, critical realism embraces methodological pluralism and any approach has the potential to yield useful data. Overall, the experience shows that it is possible to modify evaluation as it unfolds, more specifically to modify data gathering, analysis, and interpretation to develop the style of evaluation that has the potential to deliver data and information useful to the evaluator. Of course, some opportunities are lost, but recovery is possible.

Mixed-method approaches to evaluation enable the strengths of one approach to compensate for the weaknesses of another. Mixed-methods evaluation uncovers different aspects of the same reality and is, therefore, ideally suited for critical realist evaluation. Adopting a style modelled on classic grounded theory is likely to be helpful in most instances. This requires that, irrespective of the detailed choices made, data analysis, interpretation, and evaluation take place immediately after data gathering, with the findings of one cycle influencing the conduct of future data collection in an iterative cycle. A database can be constructed recording performance measurement data, explanation, and understanding of the scheme and issues to be investigated from several different perspectives over a relatively short

period. An additional benefit for participants is that it enables additional support to be either requested or offered.

In this research, data interpretation moved from an abstract perspective to be replaced with a contextually specific perspective through abduction and retroduction. Abduction and retroduction are particularly useful in identifying plausible causal mechanisms which are not directly observable. Additionally, causality is a contextually dependent tendency and cannot be viewed as a regularity functioning through direct determination. In this research data analysis focused primarily upon a descriptive analysis of the available quantitative data followed by abduction and retroduction based upon semi-structured qualitative interviews. Mistakes were made in waiting too long to analyse interviews, with virtually all being completed before data analysis and interpretation began. An approach closer to grounded theory would have been more helpful, even though timing meant that in any event all data was gathered retrospectively and relied heavily upon participant memory and self-awareness. This would have enabled monitoring to take place identifying aspects of the scheme that were working well, in addition to beneficial changes. Knowledge gained at this stage also allowed decisions to be made in the event that any specific project was deemed to be drifting too far from the anticipated (promised?) outcome.

The critical realist approach used here was concerned with the specifics of the intervention, the APoC scheme; how and why the intervention takes the form it did and how and why it operated as it did. It was not concerned with the capability of the intervention to facilitate change, which is often the primary focus of critical realist evaluation of social programmes. The critical realist view regards each intervention as contextually specific, influenced by contingent circumstances, and it is therefore, not possible to draw data from other interventions other than by adopting principals of critical interpretive synthesis, reflective practice or qualitative meta-analysis.

In Blaikie's (2007) terms, this research strategy is categorised as ontologically depth realist and epistemologically neo-realist. Conventional evaluation is effectively shallow realist and empiricist. If one single, very small study can make a contribution to something as important as enhancing evaluation, then this is because it affirms the need for critical methodological pluralism to permeate social sciences in order to contribute to overcoming myopic, unidimensional perspectives. The weakness inherent in this research is its inability to predict occurrences or anticipate situations – reality is far too complex and dynamic, and causal influences lie beyond the reach of direct observation. The difference between this research and conventional retroductive research paradigms lies in the inability to test empirically the hypothesised explanation put forward. The idealised view of retroduction in realist paradigms cannot accommodate depth ontology, because it does not recognise the possibility of explanation lying beyond visible and observable strata and the need for inference to transcend empirical and actual strata to reach the real stratum.

Finally, this research is limited by artificial project requirements that prevent full disclosure and discussion of several significant issues identified through critical realist evaluation that may have been influential in the development and operation of APoC. For example, in addition to the issues identified, critical realist metatheory would enable discussion to expand to the following four examples of issues that appear to merit attention:-

a) critique of the dominant power relationships that clearly influenced the conception of APoC and the development of the proposal, which sustain inequalities;
b) appraisal of the influence of the taken-for-granted assumption that innovation <u>is</u> a driver of economic development, growth, and prosperity <u>and</u> that conditions in the West Midlands were such that APoC was the appropriate choice of mechanism to use to disrupt equilibrium to induce change;

c) a case by case exploration of trigger events influencing mechanisms achieving varied outcomes;
d) addressing the inadequacies of the hegemony of positivism and empiricism in scientific realism.

Each of these issues, cited merely as examples, with no particular order or precedence, would each require an independent project to investigate thoroughly.

6.3 – Summary

This summary is structured to address important questions posed by the principal research aims.

What is the value added to evaluation by adopting a critical realist approach?

The principal value added by a critical realist approach lies in its challenge to the hegemony of narrow perspectives, illustrated by the specific outcomes reported in sub-sections 5.4 – Stage Four - Retroduction and 6.1 – Enhanced Knowledge of APoC. It does not accept the limitations of positivist epistemology. Critical realist evaluation provides a realistic reflection of reality embracing inherent dynamism and interpretation of an objective reality.

Critical realist evaluation brings greater insight into trigger events that cause mechanisms to function and is indicative of possible points of influence in inducing change. Change inevitably impacts on stakeholders in a variety of ways and the question of improvement, in what terms and for whom, given plurality of outcomes and perspective, needs to be asked. A critical realist approach to evaluation better equips evaluators to inform decision-makers of the possible consequences of any decisions they make to modify the intervention because it provides a deeper, broader

understanding of the mechanisms and interrelationships that drive the intervention and the countervailing mechanisms that prevent or obstruct activities.

The outcomes arising from evaluation are contextually specific and it is not safe to regard any findings as generalizable beyond the context in which the evaluation was conducted. Critical realist evaluation takes into account the inherent characteristics of the social world and reflects the dynamic nature of relationships operating in an open system. Consequently, it adds value by providing a more realistic portrayal of context than either narrow traditional or realist evaluation. This enables future circumstances and possible effects of modifications to schemes to be anticipated, but discounts the artificial certainty that often accompanies predictions emanating from most evaluation approaches.

How does a critical realist approach to evaluation differ from other approaches?

Early approaches to evaluation tended to be a linear process focused upon the pre-determination of performance measurement indicators, gathering quantitative data relating to the designated indicators, and judgement of whether the performance achieved is acceptable. Critical realist evaluation focuses upon explanation and understanding, with no pre-definition of specific areas of investigation or determination of criteria to judge outcomes.

Critical realist evaluation tends to favour mixed-method approaches, whereas early evaluation styles were invariably quantitative, perhaps employing multiple quantitative methods before later approaches tended to substitute qualitative for quantitative research. This tended to mean that evaluation is often highly standardised, with limited variation in performance measures. Critical realist evaluation in contextually specific; each application is unique.

The crux of critical realist evaluation is depth ontology, recognising both location and spread of generative mechanisms that transcend the empirical domain. A common misunderstanding is that critical realist evaluation renders visible the hidden, invisible mechanisms and relationships. Careful use of abduction and retroduction leads to plausible explanations of the function invisible mechanisms. Neither deduction nor induction can transcend the empirical domain.

Evaluators have a reflexive role in all forms of evaluation. In traditional evaluations evaluators remain conduits, transmitting an assumed neutral account of an external reality; but they still select the data gathered, the methods adopted, and the forms of communication. Evaluators in critical realist evaluations also select data, techniques and forms of communication, but they are facilitators, constructing knowledge from meanings derived from the actions of others.

There is a lack of consensus on how to improve evaluation. Critical realist metatheory may offer a way forward.

How does critical realist metatheory conceptualise causality and prediction?

Critical realist metatheory conceptualises causality as arising from causal powers that trigger generative mechanisms. Causal power exists as a potential that is sometimes exercised, but it does not have to be. The effect it produces may be observed or not observed.

Realist ontology regards ‘truth’ as existing external to the observer and assumes that, providing the observer selects the correct method, it is accessible. Abduction and retroduction are necessary to explain the mechanisms that cause events, meaning,

relationships, consistencies, and transfactual conditions. Causality is generative, does not arise following successionist principles, and depends upon mechanisms and interrelationships. There are no causal laws, only tendencies.

Social science cannot make predictions because open systems characterise social science and repetitive (regularities) relationships (constant conjunctions) are implausible. At best, critical realist evaluation may be indicative of demi-regularities in tightly constrained, limited circumstances, which may be indicative of plausible interrelationships.

What are the implications of depth ontology?

Ontological depth confirms that the 'flat' ontology underpinning the positivist-subjectivist dichotomy cannot provide a satisfactory explanatory model. It is, therefore, essential to embrace critical realist metatheory in order to embrace depth ontology.

Does the argument developed in this thesis stand alone with its implications for evaluation or are the conclusions solely dependent upon evaluation?

This research is contextually specific and it is not safe, without further research, to regard the findings and conclusions as anything other than an illustration of a particular form of evaluation applied to a specific intervention. However, this research could contribute to wider analysis if an appropriate form of critical interpretive synthesis, reflective practice, or qualitative meta-analysis is applied.

This research is indicative of the scope and potential of analysis undertaken from the perspective of critical realist metatheory, confirming the need for continuing research to enhance understanding and appreciation of critical realism.

This research illustrates that the total activity subsumed within the label ‘an evaluation’ is heavily contingent upon the purpose of undertaking the evaluation and what is being evaluated. It always involves evaluator/researcher judgement and interpretation whether addressing comparisons of actual versus target performance or whether newly illuminated processes and outcomes are acceptable. There are many different styles of evaluation, which have evolved through time, but common activities include collecting, analysing, and interpreting data and information to assist in making judgements, whilst contemporary styles of evaluation also embrace illuminating new insights, understanding processes, and explaining operations and outcomes. Whilst there different alternatives from which to choose, and methods can be combined there are clear differences between styles overlaying some similarities. Often even within ontologically similar approaches to research underpinning styles of evaluation, there are epistemological differences which influence the choice of approach to adopt.

Evaluation is now regarded as a broad-based activity evolving over time. There is a lack of consensus on the appropriateness of applications and poor understanding of the relationships between research and evaluation, but evaluator/researcher judgement is contextually sensitive. Contemporary styles tended to invoke mechanisms in providing explanations, where those explanations are formed as C-M-O propositions or more flexible statements of plausible explanation. Styles of research underpinning evaluation based upon critical realism are especially suited to providing plausible explanations, understanding influences driving causality, understanding meaning and the influence of interpretation and identifying and

explaining unforeseen outcomes. Whilst a critical realist approach cannot illuminate the hidden, it offers an approach that enables the researcher to delve below visible, experiential strata to develop an understanding of what must lie hidden for plausible explanations to be possible.

7.0 - Implications of Research Findings

7.1 - Implications for Researchers

The principal target audience for outcomes arising from this research is fellow academic researchers. Huff (1999, p.45-46) advocates planning and developing scholarly writing by envisaging a conversation taking place between the author and others whom the author seeks to engage. Adopting this principle at the surface level of abstraction, there are two groups of fellow researchers whom the research engages. Firstly, extending fundamental principles and developing empirical methodologies in applied social sciences including management resonates with critical realists such as Fleetwood, Bhaskar, Elder-Vass, and Danermark. It is clear that the core literature shaped the research. Secondly, illustrating how and why critical realist metatheory broadens, deepens, and enhances evaluation methodology engages those specialising in evaluation, especially of support intervention programmes drawing on public resources. Conversants such as Pawson and Tilley, Potter and Storey, and Grice are, therefore, targeted.

The research demonstrates to other researchers, not yet persuaded by the merits of critical realism, that ontological depth, the Transformational Model of Social Activity (TMSA), and a clear separation between ontology and epistemology offer the potential to make a significant contribution to research in social sciences. Fellow researchers who focus upon empiricism are targeted with a demonstration of the practical stages involved in applying critical realist metatheory in an example of empirical research. In particular, this research demonstrates the value of counterfactual argumentation in developing plausible explanations, but does not underestimate the difficulty of maintaining plausibility. Of course, the noted absence of a clear ontology-epistemology-methodology statement in critical realism and espousing methodological pluralism means that the research is not a definitive

statement; rather it stands as an example of possibilities, and fellow researchers will need to evaluate where ideas and issues, useful in their specific context, might add value to their research.

The research also demonstrates that critical realist metatheory places emphasis on the primacy of explanation and understanding over description. Empiricism and relying on sensory data cannot fully detect generative mechanisms and, hence, cannot provide inclusive explanation as a basis for prediction. Multiple abstractions should not be perceived as alternatives, but present complementary perspectives facilitating the development of comprehensive explanation and understanding of phenomena. Visible outcomes represent the pinnacle of generative mechanisms, but deeper analysis is required to locate causal processes. Inference brings insight into the trigger mechanisms driving generative processes giving rise to visible outcomes.

The principal contributions of this research, from a methodological perspective relate to the demonstration of an approach that enables hidden generative and explanatory mechanisms to be explored through acceptance and understanding of depth ontology. Application of the principals of abduction and retroduction, which primarily comprise data interpretation by the researcher / evaluator, and the role of inference enable proposals to be formulated that provide plausible explanations for observed outcomes. For example, conventional evaluation would not have revealed the extent to which business and commercial skills were being developed through the generative mechanisms driving the commercialisation process which provides opportunities for experiential learning for participants in this research.

Another contribution is the emphasis upon data interpretation, building on data gathering, analysis, and evaluation that may have taken place in any conventional or recognised methodology appropriate to context. Methodological pluralism, at the

heart of critical realist metatheory, demonstrates that the approach is inclusive rather than exclusive. All forms of data gathering and data analysis contribute, and the distinguishing feature is data interpretation. The research clearly shows that richness in evaluation / research outcomes is dependent upon sophisticated data interpretation embracing the unique features of critical realist metatheory, such as depth ontology, multiple outcomes, the rejection of linear causality, repeatability, and regularities.

The researcher plays an important role in making methodological choices and in drawing insight from the information generated through data interpretation. This research demonstrates the importance of researcher judgement and reflexivity in choosing what to interpret and how to interpret, as well as in the creative development of plausible explanations.

The use of the term ‘stage’ may create the impression of purposefully following a linear sequential process. However, this was not the case in practice and serves to underscore the difficulty of representing an emergent activity punctuated by iteration, changes in direction, and the eclectic selection of appropriate methodological tools and techniques. It is a unique example of evaluation that demonstrates how critical realist metatheory extends realist evaluation. It gives voice to the hidden components of generative mechanisms, and emancipates those elements trapped or suppressed by the hegemony of single-point causality, thought to be explained by consistent and constant conjunctions forming regularities. The research also shows that evaluation is a fruitful area for future research with opportunities to develop a progressive agenda focused on enhancing contribution to programme / scheme development.

7.2 – Implications For Practitioners.

The principal contributions to knowledge emerging from this research are best articulated in the context of evaluation practitioners. Practitioners who engage in evaluation will be interested in both the justification for adopting a critical realist metatheory and the additionality of outcomes vis-à-vis conventional approaches. It is likely that practitioners will take a highly pragmatic view and this research will be of interest because there is demonstrable added value in the specific context, which can be brought about in other contexts where a similar approach is adopted, relevant to the practitioner's needs at the time. Practitioners must recognise that a simple, linear representation of evaluation processes is attractive because of its simplicity, but understates the importance of iteration in gaining comprehensive understanding. Critical realist perspectives recognise the uncertainty inherent in prediction based on assumptions of universal regularities and repetition in an open environment. Critical realism adds depth to understanding intervention processes and will, therefore, be particularly useful when evaluating new schemes and / or those schemes where there is a high probability that intervention could be re-modelled to enhance effectiveness and efficiency.

The research demonstrates the limitation of relying on a linear sequential conventional evaluation approach, whether primarily utilising intrinsic or extrinsic methodologies or quantitative or qualitative data, because they can provide only limited performance measurement and little insight into explanation and understanding. Relying solely on evaluating visible outcomes can provide only a partial assessment of performance. As a doctor uses symptoms to diagnose the underlying causes of illness, an evaluator must use detectable outcomes as indicators of underlying generative mechanisms which give rise to the visible outcomes detected.

Adopting a critical realist perspective enables evaluation to move beyond reliance on simple measures to broaden the scope of anticipated outcomes for framing evaluation criteria. Application of revised approaches to evaluation enables decision-makers to focus support resources upon stimulating behaviour and facilitating conditions which trigger generative mechanisms producing desired outcomes. For example, notwithstanding the philosophical arguments of whether generative mechanisms can be considered to exist in social sciences, Bygstad (2010) proposes two interacting mechanisms that are generative in developing new ICT-based services: the innovation mechanism and the service mechanism. The innovation mechanism could be enhanced by stimulating human creativity and the apparently inherent desire to 'improve' current conditions.

This research shows that decision-makers have at their disposal an approach that leads to deeper, broader information that can lead to higher quality decisions. There is a need to design evaluation into any scheme. It helps identify the influences on successful achievement. Additionally, given that one of the principal foci for evaluation concerns the ability of an intervention to induce change, then some contributions to knowledge might also be expressed in the context of a support service professional designing or implementing interventions.

Increasing the breadth and depth of the information generated and used in designing future interventions, or implementing modifications to existing interventions, does not overcome the inherent fallibility of prediction or explanation. It does, however, increase the ability to identify misinterpretations or inappropriate representations that require further investigation to reduce fallibility. Simpler models are equally fallible, but it is much more difficult to account for imperfections in a less than comprehensive explanatory model.

Practitioners must recognise the limitation of defining the scope for their evaluation, rather than allowing outcomes and evidence to emerge. Pre-defined evaluation criteria are often too myopic, leading to a false impression of successful accomplishment against understated performance criteria whilst simultaneously failing to recognise untapped potential. This research demonstrates that outcomes may arise in forms which were not anticipated or predicted and which were not articulated in predetermined performance targets. Initial evaluation of APoC in the classical experimental form did not, for example, foreshadow learning as an outcome.

The research has indicated the extent to which it is necessary to reflect multiple influences upon observed outcomes when developing explanations and interpreting outcomes. Relying upon single-point, linear causality based upon regularities seriously understates the plurality of influences on observed outcomes. As a consequence explanation is seriously weakened, and prediction becomes unreliable. Hence, designing modifications to existing interventions and designing completely new interventions cannot be undertaken with any confidence in achieving the desired outcome, since the context is unlikely to be repeated with sufficient congruence to previous circumstances.

This research has drawn on an established explanatory research model illustrating how and why the intervention has functioned in the way that it has. Although, the findings are not transferable to any other context the principles of how the model was used may be useful as a guide to others seeking to develop explanatory representations of intervention schemes operating in other contexts. Researcher judgement is a crucial element in deciding what can be taken from this research and applied in another context.

7.3 - Limitations

Although the nature of the approach adopted in this research meant that all conclusions and findings are necessarily contextually specific, this does not mean that the implications arising are similarly restricted. Conventional researchers who value generalisability alone may consider contextual specificity a limitation but progress is made when conclusions and findings developed in one context are applied in other contexts and shown to add value. The form of the findings and conclusions from this research are not suitable for inclusion in basic, quantitative meta-analyses but can be readily included in forms of qualitative or mixed-method meta-analyses, such as qualitative synthesis, reflective practice, or critical interpretive synthesis. A further limitation is that the research is of limited scope – only one scheme was investigated and expanded results may have arisen had it been possible to explore the evaluation of innovation support in other contexts and this research has not demonstrated directly that the specific findings related to the APoC scheme are applicable to other similar or related schemes. However, the findings and conclusions concerning critical realism, especially in the context of its potential in underpinning research providing data and information into evaluation has been demonstrated. Further research adopting critical realist metatheory in evaluation studies is needed to strengthen the contention that critical realism adds value in a wide range of contexts.

The heart of retroduction is the attempt to link together explanation and causality in a plausible, but not necessarily actual, set of circumstances. One of the principal difficulties of employing counterfactual argumentation is the inability to collect data about situations that are plausible, even possible, but not actual, at the time when data is being collected.

Overcoming the difficulty of conducting historical research by designing critical realist metatheory-based evaluation into the development, implementation, and operation of an intervention would enable real-time interaction between participants and researchers that might prove mutually beneficial. However, retrospective analysis was the only option available, given the timing of this research. The researcher was limited to working with data already gathered because changes in the provision of support services, locally and nationally, mean that there is no other comparable context within which to collect additional data for comparative analysis. Since APoC no longer exists, unfortunately, this also meant that an opportunity to collect additional empirical data, when undertaking comparative analysis of abstractions, was not available. Neither was the opportunity to engage in real-time interviewing and longitudinal assessment. Care was taken to avoid creating a tautologous argument, in seeking to confirm outcomes with data drawn from the same pool used for the original analysis.

A further difficulty encountered in this research, which can be avoided by designing in and engaging in evaluation from inception of the scheme, is that the conventional evaluation used as a comparator was not undertaken by the researcher. Fortunately, the researcher was able to modify the final round of follow-up data collection and gather some qualitative data, albeit retrospectively, that provided an additional perspective on scheme outcomes.

Mistakes made by the researcher, especially in not moving to data analysis and interpretation immediately after data collection on an interview by interview basis, have limited the value of the research. The methodology could be improved by adopting an approach more closely modelled upon grounded theory. This would have entailed engaging in data analysis immediately after collecting data and, whilst building analysis piece by piece, risks being unable to appreciate the wider scope of

developments. It enables outcomes to influence future data gathering; this is particularly useful where emergent and unexpected issues have important impacts.

Nevertheless, conducting the research was developmental for the researcher. Learning achieved from this, to the researcher, exploratory project will enable future opportunities to yield enhanced results; for example, the researcher has gained valuable experience and is better equipped to use field notes when gathering qualitative data, write more meaningful memos in data analysis, and undertake data interpretation using abduction and retroduction.

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Appendices

Appendix 1 - APoC Second Follow-up Questionnaire

(including researcher-inserted supplementary questions and coding for database entry)

Circulated December 2011

1a – Please give a short description of the outcome of the status project and how it has or will impact the business as a whole. **(DSCP)**

1b – Please note any significant impacts on the West Midlands Region that are not accounted for elsewhere in this questionnaire. **(IMPT)**

2a – Please indicate if the project developed with APOC funding is: **(STTS)**

On-going **(OOGO)**
Unsuccessful **(UNSC)**
Complete but not yet at market **(CNYM)**
Complete and introduced to market **(CMPT)**

2b – If the product has not yet reached the market, when do you anticipate it doing so? **(WHEN)**

2c – If the product is at or nearing market, how do you anticipate commercialising it? **(COMM)**

3 – What is the current turnover of your business as per your most recent financial year end? **(T/O)**

4a – Has any IPR developed under the APOC project been licensed to a subsidiary or third party? **(IPR)**

4b – If so, please name that company. **(NAME)**

5 – APoC provided funding for five categories of support and you received funding in one or more of them. Please indicate for each category in which you received support how valuable the funding was in helping you progress your project to its current status.
Scale: 1= no impact – 6 = essential

A – Intellectual Property Support: **(IPRS)**
B – Prototyping: **(PTYP)**
C - Market Assessment: **(MKTA)**
D – Business Planning: **(BUSP)**
E - Management Support: **(MANS)**

6 – As part of this project or as a result of this project have any new patents or designs been registered? **(PATS)**

7 – As part of this project or as a result of this project has a new Business Plan been written or an existing Business Plan been significantly updated? **(NEWBP)**

8 – Has any external investment been raised during or after the conclusion of this project to continue the development of the product or service? **(EXTF)**

9a - Are you currently seeking funding? **(FND?)**

9b - If so, how much? **(AMNT)**

10 - Since the conclusion of the APoC Project has any further support, training or advice been received from any University or public support organisation?

A – Name of Support Provider **(SPNM)**
B – Address **(SPAD)**
C – Telephone **(SPTL)**
D – Date range of collaboration **(DATE)**
E - Value spent by company **(VALU)**
F – Number of days support received **(SPDY)**
G – Nature of Support **(SPTY)**

11 – You may have indicated that jobs would be safeguarded through the successful delivery of this project. If so, please provide details:

A – Job Title **(JSJT)**
B – Contract duration **(JSCD)**
C – Hours of work **(JSHW)**
D – Job location **(JSJL)**
E – Is the job safe for the next twelve months? **(JS12)**
F – Gender of current employee holding job **(JSGN)**

12 – Please briefly describe how the project has safeguarded the jobs listed **(SGJB)**

13 – You may have indicated that jobs would be created through the successful delivery of this project. If this is the case, please provide details of these jobs.

A – Job Title **(JCTL)**
B – Expected start date **(JCSD)**
C – Contract duration **(JCCD)**
D - Hours of work **(JCHW)**
E – Job location **(JCJL)**
F – Gender of current employee holding job **(JCGN)**

14 – Were there any unintended or unforeseen consequences of the APoC project: **(UNFS)**

15 – If there were unforeseen consequences have these affected the project outcome? **(UFIT)**

15a – if so, how? **(UFHW)**

16 – If the APoC project was unsuccessful or has not been taken any further, what are you doing now?

A – not applicable **(UNNA)**
B – business trading as before **(UNTD)**
C – business developing an alternative product **(UNAP)**
D – business ceased trading **(UNCT)**
E – developing new business **(UNNB)**
F – now working for third party **(UNTP)**
G – other **(UNOT)**

17a – Have you revised your strategic aims/objectives since applying for APoC Funding? **(RVSA)**

17b – What were the top three things that influenced this change?

A – Being successful in applying for the APoC grant **(GRNT)**
B – Successfully completing the APoC project **(APoC)**
C – Change in business ownership/directors **(NEWO)**
D – Receiving further funding after APoC **(FUND)**

E – Other **(OTHR)**
F – Other **(OTHR)**
G – Other **(OTHR)**

18 – Up-dated Outcomes

A – Jobs Safeguarded **(JSE)** expected **(JSD)** declared
B – Jobs Created **(JCE)** expected **(JCD)** declared
C – New Investment Raised **(NIRE)** expected **(NIRD)** declared
D - New Products Brought to Market **(NPBME)** expected **(NPBMD)** declared
E – New Patents Registered **(NPRE)** expected **(NPRD)** declared
F – New Business Plan **(NBPE)** expected **(NBPD)** declared

19a – New Company created **(NCCR)**

19b – New Company Registration Number **(NCRN)**

20 – Funding received from APoC **(FDAP)**
(Researcher inserted supplementary questions were questions 5, 14, 15 & 15a, and 17a and 17b)

Appendix 2 - Scheme Management Attributes

Node	Gender	Position	Representative Role	Date of Interview
SM01	M	APoC Fund Manager	Management	07/09/2011
SM02	M	Interim Director	Management	15/09/2011
SM03	F	Director	Panel Member	20/09/2011
SM041	M	Head of Finance	Senior Management	21/09/2011
SM05	M	Centre Manager	Node Manager	21/09/2011
SM06	M	Former Director	Management	22/09/2011
SM07	M	Retired	BDA	26/09/2011
SM08	M	Regional Manager	BDA	28/09/2011
SM09	F	Economic Development Officer	BDA	29/09/2011
SM10	F	Director of Innovation	BDA	29/09/2011
SM11	M	Chief Executive	Node Manager	29/09/2011
SM12	M	Business Development Manager	BDA	12/10/2011
SM13	M	Professor	BDA	12/10/2011
SM14	M	Managing Director	Node Manager	20/10/2011
SM15	F	Chief Executive Officer	Panel Member	15/11/2011
-	F	Project Officer		
-	M	Chief Executive		
-	F	Director of Strategy		
-	F	Director		
-	M	Unknown		
-	M	Chief Executive Officer		
-	M	Chief Executive Officer		
-	M	BDA / Consultant		
-	M	BDA / Consultant		
-	F	BDA / Consultant		
-	M	BDA / Consultant		
-	M	Unknown		
-	M	BDA / Consultant		
-	F	BDA / Consultant		
-	M	BDA / Consultant		
-	M	Director		
-	M	Director of Node		
-	M	Executive Director		
-	F	Business Incubation Manager		
-	M	BDA / Consultant		
-	M	BDA / Consultant		
-	F	BDA / Consultant		

Appendix 3 – Enterprise Attributes

Ref.	Co. ID	Gender	Contact Position	A	R	NA	Int.
E 01	100417	M	Director	X			30/04/2012
E 02	100836	M	Business Development Manager		X		08/05/2012
E 02	100927	M	Business Development Manager	X			08/05/2012
E 03	100173	M	Financial Director		X		09/05/2012
E 04	100084	M	Managing Director	X			09/05/2012
E 05	100451	M	Technical Director		X		10/05/2012
E 06	100442	F	Marketing Director		X		10/05/2012
E 07	100226	M	Director	X			10/05/2012
E 08	100212	F	Director of Research		X		15/05/2012
E 09	100607	M	Director	X			22/05/2012
E 10	100890	M	Deputy Chairman	X			23/05/2012
E 11	100922	F	Business Development Manager	X			23/05/2012
E 11	100923	F	Business Development Manager			X	23/05/2012
E 12	100855	M	Director	X			24/05/2012
E 13	100332	M	Business Development Manager			X	24/05/2012
E 14	100918	M	Director	X			28/05/2012
E 15	100170	M	Managing Director	X			28/05/2012
E 16	100781	M	Managing Director	X			28/05/2012
E 17	100664	F	Director	X			29/05/2012
E 18	100617	M	Partners	X			30/05/2012
E 19	100723	M	Director			X	26/06/2012
E 20	100774	M	Director	X			27/06/2012
E 21	100469	M	Director	X			11/07/2012
E 22	100062	M	Director	X			11/07/2012
E 23	100563	M	Director	X			12/07/2012
E 24	100503	M	Managing Director	X			23/07/2012
E 25	100245	M	Director	X			23/07/2012
E 26	100724	M	Technical Director	X			24/07/2012
E 27	100219	M	Marketing Director	X			31/07/2012
E 28	100431	M	Director	X			22/08/2012
E 29	100455	M	Owner	X			22/08/2012
E 30	100246	M	Owner	X			23/08/2012
E 31	100158	M	Managing Director	X			23/08/2012
E 32	100817	F	Director	X			23/08/2012
E 33	100136	M	Managing Director	X			25/09/2012
E 33	100813	M	Managing Director	X			25/09/2012

A = Award accepted
R = Application rejected
NA = Award offer not taken up

Appendix 4 - Analysis/Interpretation of Feedback
(Received in December 2011 and January 2012)

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
100032*	Company wound up in 2010.			**W**
100035*	Using the APoC funding we were able to successfully develop and test our innovative bandage system for the veterinary market. We were also able to file for patent on our design.	We have maintained our head office but have now commissioned a manufacturer in the Midlands.	Manufacture in West Midlands	**Pr Pa**
100059*	The Proof of Concept built the first [product]. Since then we have financed a second construction at ??? A further [product] will be built in the New Year (2012) in Oxford and one in ??? We hope to roll out construction in Africa in late 2012.			**Pr**
100062*	The main potential clients identified appear, for the moment, not to be interested in pursuing the project.		Missed market opportunity? Customers not interested or mis-directed product?	**n/a**
100080*	We have proven beyond doubt the segmented hydrofoil is a viable solution. Also the updated hull dynamics and deck ergonomics work very well. These have been harmonised in production and collectively been proven in over 500 hours of use. The boats have been introduced to critical acclaim.	All fabrication and seats (approx. £740000) in the West Midlands to date.	Manufacture in West Midlands Refers to critical acclaim	**Pr L**
100084*	[Product name] is maturing as a product. University research has proven the material application and thermal modelling has been validated by empirical measurement.	[Product name] has received numerous delegations from India and China: Enjoying our leadership!	Refers to market leadership. Boosted by recession.	**Pr**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	Economic austerity has refocused audiences on energy costs and provides opportunity.			
100106*	Product launched in UK, Hong Kong and Canada (Child's Version). Limited sales to date. Currently looking for distributors.		Limited success	**PL**
100107*	Part of the funding was used to research market demand for the pant protector. The positive results we gained enabled us to attract investment to fully develop and launch the product. We are now selling the product in Sainsbury, Morrison, Asda, Wilkinson and Amazon.	We have employed a locally based IP lawyer, design agency, accountant and PR agency.	Local services used	**MR** **PD** **I** **PL**
100136*	Project demonstrated the application of plasma technology to the safe, environmentally benign and economically feasible treatment of spent pot lining. To date however, we have not been able to secure a contract for commercial production.	None	Missed market opportunity?	**Pr**
100158*	Proof of concept design work completed ready to take to manufacturing stage. Two new patents submitted as a result of that work.	Product is manufactured in the West Midlands		**PoC** **Pa**
100160*	Whilst a great deal of interest was shown in the product [product], we are unable to secure any sales. We believe the economic downturn combined with redundancies in large companies and poor access to investment capital are contributing factors. We have put the project on ice for the next few years until the economy is in better		Missed market opportunity Recession Lack of access to capital	**Sus**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	shape.			
100170*	The concept phase is complete and the software has achieved β stage in its development. We are introducing it as part of a course (post graduate level seven in 'Lean Management') and are looking for an industrial reference site to trial in the field. The new name of the software is '[name]'.	The impact will be to have a completely new business offering significant business for [company name] as developers (Shropshire SME).	New business	**PoC L**
100181*	Patent applications have been pursued in key SE Asian markets and are progressing well through respective National patent offices.			**Pa**
100219*	The project provided important new information on inter-operability in the Midlands Automotive Supply Chain. It provided evidence of opportunity which has led to new product development and new business partnership.	[product name] project.	New partnership	**PD L**
100226*	The project output was a negative result as regards the commercial viability of an electronically managed sign even though the product was proven to be technically viable. However, as a result of the project work context two new iterations were proven to be viable and are under further development by [company name].	None yet.	Missed market opportunity Proven feasibility	**PD L**
100245*	The system has been completed, demonstrated to a 'blue chip' company. They have sponsored the product by putting their name on it. Currently, we are	Not yet as we have not found a reference site to prove the use of the system.	Obtained sponsorship	**PoC**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	marketing to their customers for reference sites.			
100246*	I.P. work is on-going. Patent design registration has been published. Product is selling but improvements are needed and matching specification to be drawn up.			**Pa PD i**
100248*	Create avenue to trade on - live with an interactive web-based training portal for our customers and potential customers.			**PL**
100266*	Continuing to have technical problems. Tried to use Aston University but ran into serious time delays. Software is now near to completion and if it works we will then be investment ready.	Taken about five times longer than anticipated but we still hope to be able to put ourselves forward as one of your success stories.		**DL**
100270*	Our Bluetooth knowledge and know-how has grown significantly. We are now increasing sales due to the "[product name]" project.	n/a		**L PL**
100288*	The project was to create a software application for which we suspected there was a market but we were not sure and we could not be sure without proof of concept to show potential customers. The project was a great success and we have since sold 41 licences of the software that was developed out of this project.	The e-store application is now the clear UK market leader in its sector.	Described as a great success!	**MR PL**
100306*	The project was….??????			

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
100329*	Patent filing and proof of concept prototypes were successfully developed. As a result an R&D grant has been obtained to provide for quality prototype nozzles and perforations designs relating to specific wipe types.		Obtained a further grant	**Pr Pa PD i l**
100358*	Our business was able to work with the initial concept and further refine it in order to introduce a suitable consumer device into the retail space. This will in turn enable our company to become revenue generating.	None to date.		**Pr PD i**
100403*	Product design refined, developed, prototyped, patent applied for, patent search all clear - until we found a similar product launched 6 years earlier that was never protected.		Facing competition that was not recognised since not a registered design	**Pr Pa**
100417*	The Specification TD was reached pre-production. We have the first ten machines being built for delivery in Q1 2012	All manufacturing has taken place in the West Midlands.	Local manufacturing	**PD**
100431*	The project was completed and has successfully been implemented with a local authority in North Wales. A second project in underway in South Wales and a third in the immediate pipeline.			**PL +**
100455*	The APoC grant project is now complete with successful testing of planter (single row unit) being completed at the end of July 2011. The concept is now definitely proved. Patents have been granted in USA, UK and EU. Whether [company name] continues with the planter or patents are licenced further investment of £500000 would be	None so far.		**PoC PL Pa**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	needed.			
100469*	Product taken to market. Came second in tender process with [company name]. Introduced to [application name].			**PL**
100484*	Seat still being tested. Now part of the NOD Programme with MAS	Ability to produce components for the aerospace sector.		**PD**
100503*	The project has focused on the performance of [product name] against influenza virus - the latter being a clinical indicator of performance against all nosocomial virus particles. Effectiveness against influenza has not proven conclusive so at this juncture the programme is being extended.		Clinical issues	**L DL**
100508*	Following the prototyping and development phase results were shown to customers of the system and on this benchmarking new business was secured to the value of £1.6 m.	New business awarded £1.6 m.		**PL**
100519*	The APoC funding allowed the design and prototyping of our fire tank, along with a market assessment. We now have a completed prototype in our yard. However, accreditation through [professional body] began last October (2010) is yet to be completed.		Delays in accreditation	**Pr MR DL**
100525*	Development and tool complete: We have had to restructure delivery and costs but have just completed marketing strategy and	Office now in Chichester.	Re-location out of region	**Pr MR**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	commercialisation project.			
100557*	Birmingham University did a great job but the market has developed so fast that "[product name]" is now market leader.		Market leader	**Pr MR**
100563*	We successfully completed design of the [prototype name]; the combination of smart metering & [product name] wireless. It has been designed into EV charge posts for the Olympics and we have two strong sales leads from Australia and Spain.			**Pr PL**
100581*	The project is on-going with the development of an integrated roof system. If successful it will create an all new part of the company selling a product as opposed to a service.			**PD**
100607*	The project allowed us to construct our first prototype, enabling us to better understand the nature of the technology.	We gained an association with the [company name] who will benefit from a percentage of our profits in return for the use of their river sites.		**Pr L**
100617*	Proof of concept achieved (via APoC). Market research (via [company name] - post APoC) Promotional films produced for pitching (post APoC) Talks currently with shower companies (post APoC) Four demonstration test rigs (post APoC).			**PoC Pr MR**
100664*	The company and consequently the project struggled due to cash flow problems caused by a sharp decline in orders in the latter part of 2010. At the same time [company name], a new company within the [company		Cash flow difficulties Change of ownership	**CH**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	name] expressed an interest in taking over the business as they were looking for an [product name] system. After lengthy negotiations [company name] acquired the stock and assists of [company name] in 2011. [company name] will continue to trade under the new name XQLE Ltd. Its main function being a consultant under contract to [company name]. The project can now progress under [company name] work has already begun to continue the project.			
100700*	We developed the unit and obtained EN1499 certification. However it later emerged that full clinical trials would be beneficial. The cost of this is beyond means for a business of our size both in terms of cost and capability. We need find a partner. Meantime, the project is on hold.		Needing more investment	**Sus**
100704*	Successful confirmation of design concepts that will support development of two beauty therapy appliances planned for launch by [company name] under the [company name] in 2013.			**PD**
100722	Units were designed and prototypes constructed. 1st units sold to a farm to prevent smell. Business has gained sales contract and financial benefits still growing.			**Pr PL**
100724*	The product development is now complete and several trials sites are becoming established in the UK. One of the trial sites in the [application name] in London.			**PD**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
100735*	Proof of concept has been achieved. Further funding of approximately £250000 is required to take the prototype to the next stage. We are talking with investors at present.	n/a	Further investment required	**PoC**
100738*	The product is now in the market and the focus is to sell for export i.e. Spain, Denmark, Holland. Selling 414,000 units in current year and 328,000 in 2009 to date.	[company name] Spain major supply contract expected to start Jan 2012 - £250000 p a.		**PL**
100772*	RTM production technique was the concept to be proven with mixed results. The original planned method of production was unsuccessful but as a spin-off a new system is in prototype development at company's cost.			**DL L**
100774*	The project assisted in further R&D of the technology, including certain modification of the machine. Testing of the products proved to be successful although a few other modifications to the machine have been identified and made. At further costs obtained from a loan the company is in discussions with a few strategic partnership possibilities in bringing the technology to market.	A new machine "pre-production" is currently being designed and then built in Coventry by a Precision Engineering company, to produce 6 cubic meters per hour.	Local production	**PD i**
100781*	The project has not yet developed at the projected rate but remains key for company growth. 30% increase in carton board prices challenge product competitiveness but will dilute over time. Some tooling problems remain to be overcome.		Rising raw material costs	**DL**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
100813*	Project uses equipment developed at Brunel University to mechanically condition molten aluminium to produce superior mechanical properties. It allows the business to target the most demanding applications and markets and out-perform its competitors.			**PD MR**
100817*	Samples currently with potential customers for evaluation.	Not yet applicable.		**Pr MR**
100819*	We are currently awaiting first-off mouldings of the product. The project had to be re-designed following trials at Cardiff University of the initial concept. The project will hopefully help us maintain our level of business during this difficult time.			**PD**
100855*	The project was extremely successful as we were able to develop a viable prototype. This performed very well at field trials and was subsequently developed into a new product for [company name] resulting in £250000 of sales in 2011. Sales of at least £250000 are expected in 2012 and are expected to increase to around £2m p a over the next five years.			**Pr PDi PL**
100890*	We are at present talking to a mould machine manufacturer who would like sole right to the process software in order for the mould tool to work on the machine. We are going through the legalities of a 3 year collaboration. This will ensure that [product name] is promoted globally. We are also			**PD**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
	talking to two potential customers who will want us to use the process on their assemblies.			
100897*	The market research study indicated a market exists for small elements in heat exchangers. Consequently, in-house performance research was prioritised and has recently been completed. Customer contact has been initiated with a view to more fully understand application details and process parameters. It is certainly too early to predict the impact on the business as a whole.	Currently there are no significant impacts on the West Midlands region.		**MR Pr**
100905*	The system is under test at present. We expect to be conducting on-site trials with a customer in 2012			**PD**
100918*	The project was successful so [company name]/Coventry University teamed up with [company name] to take the project to the next level through European Funding. The initial proposal was unsuccessful so we re-applied in October 2011. [company name] will now lead the project, if successful.			**DL**
100922*	A comprehensive market review has validated the concept. We now have the information to allow a final decision on whether to set up a spin-out company based on the patent family.			**MR**
100927*	New company formed and business plan written.	Anticipated recruitment of new staff.	Held back by absence of local resources – needed overseas help.	**I N Pa PD**

Co. Database ID	Description of Outcome of APoC Grant	Impact in the Region	Researcher Note	Code
				Pr

Key :

??? = Unable to decipher handwriting
CH = Change of ownership - 1 Occurrence
DL = Delay – 6 Occurrences
I = Obtained external investment – 2 Occurrences
L = Learning – 8 Occurrences
MR = Market Research – 10 Occurrences
N = New company created – 1 Occurrence
Pa = Patent Applied for – 7 Occurrences
PD = Product Development – 12 Occurrences
PDI = Improvements through product development – 5 Occurrences
PL = Product launched – 11 Occurrences
PL + = Product launched leading to further products – 2 Occurrences
PoC = Proof of Concept – 6 Occurrences
Pr = Prototype built – 18 Occurrences
Sus = Project suspended – 2 Occurrences
W = Company wound up – 1 Occurrence

Appendix 5 - Equivalence in Code Application

Scheme Management			Enterprises	
Primary Node	Node Division	Sub-Node	Primary Node	Sub-Node
Descriptions	APoC Development	Aims	Descriptions	
		Development Process		
		Expected Outcomes		
		Initial Concept		
		Instigator		
		Involvement in Development		
		Managing Agent		
		Prerequisites		
		Prior Experience in Development		
		Proposal		
		Rationale D		
		Reason for Involvement in Development		
		Regional Characteristics		
		Tender Process and Choice of Managing Agent		
	APoC Implementation	Actual Outcomes		Actual Outcomes
		Administrative Arrangements		Administrative Arrangements
				Alternatives to APoC
				Applicant Characteristics
		Application Procedure		Application Procedure
		Application Procedure Criteria for Advancement		Application Procedure Criteria for Advancement
				APoC II Development
		BDA Role		BDA Role
				Commercialisation Stages
		Control		
		Decision-Making Panels		Decision-Making Panels
		Decision-Making Procedure		
		Difficulties		Difficulties
		Ending the Scheme		Ending the Scheme
		Feedback from Applicants		
				Feelings on Hearing the Outcome of Application
				Final Outcome
				Initial Contact
		Involvement in Implementation		
				Managerial Issues

Scheme Management			Enterprises	
		Marketing		
				Non-grant Funding
		Other Activities		
				Plans for using APoC
		Prior Experience in Implementation		
				Purpose of APoC
		Qualifying Activities		Qualifying Activities
		Rationale I		
		Reason for Involvement in Implementation		
		Relationships		
		Type of Applicants		
Evaluation		Alternatives to APOC	Evaluation	
		Application Procedure Successes		
		Failures		Failures
				Help and Support
		Learning Achieved		Learning Achieved
		Marketing Success		
		Measures of Success		
				Obstacles
		Outcome Successes		Outcome Successes
		Problems with Previous Schemes		
		Quality of Applicants		
				Recommendations for Support Services
		Value Added by APOC		Value Added by APOC
Explanations		Causes of Added Value	Explanations	Causes of Added Value
		Causes of Application Successes		Causes of Application Successes
		Causes of Bid Success		
		Causes of Failures		Causes of Failures (APoC)
				Causes of Failures (Non-APoC)
		Causes of Learning Achieved		Causes of Learning Achieved
		Causes of Marketing Outcomes		
		Causes of Outcome Successes		Causes of Outcome Successes
				Grant versus Loan
				Influences on Decisions
				Justification
				Network
				Personal Aims
				Rationale for Applying
				Role of Government
				Scope of Influences on the Business
				Serendipity

Scheme Management			Enterprises	
Interpretations			Interpretations	Advice Offered
				APoC Target Market
				Changed Plans
		Development Decisions		Development Decisions
		Exclusivity		Exclusivity
				Future Support Needs for Innovators or Entrepreneurs
				Help Needed
				Meaning of Evaluation
				Meaning of Proof of Concept
		Modifications		Modifications
				Public Perception (of inventors)
				Reactions
		Role of ERDF		Role of ERDF
		Scheme Strengths		Scheme Strengths
		Scheme Weaknesses		Scheme Weaknesses

Appendix 6 - Node x Scheme Management Table

		SM 01	SM 02	SM 03	SM 04	SM 05	SM 06	SM 07	SM 08	SM 09	SM 10	SM 11	SM 12	SM 13	SM 14	SM 15	Total
Descriptions – APoC Development	Aims	3	3	2	1	0	2	0	1	1	1	0	1	0	1	3	19
	Development Process	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
	Expected Outcomes	1	3	0	3	2	2	0	1	1	2	0	1	0	0	1	17
	Initial Concept	4	11	0	1	2	4	0	0	0	1	0	0	0	3	0	26
	Instigator	10	7	2	2	1	5	0	3	5	3	0	1	1	8	1	49
	Involvement in Development	1	0	1	1	3	6	2	0	0	1	0	2	3	2	0	22
	Managing Agent	2	6	0	1	0	0	0	1	0	0	0	1	0	0	0	11
	Prerequisites	4	10	0	1	0	0	0	0	1	0	0	0	0	1	0	17
	Prior Experience in Development	0	0	2	1	3	1	0	1	0	0	0	1	0	0	0	9
	Proposal	4	1	0	1	0	3	0	1	0	0	0	0	0	0	0	10
	Rationale D	7	1	1	7	0	5	0	2	0	3	0	2	3	1	0	32
	Reason for Involvement in Development	0	0	0	0	0	0	0	1	0	1	0	1	2	1	0	6
	Regional Characteristics	4	4	4	1	3	5	0	1	5	4	0	1	1	2	1	36

	Tender Process and Choice of Managing Agent	0	0	0	6	0	4	0	1	3	2	0	2	2	5	1	26
APoC Implementation	Actual Outcomes	5	1	2	0	3	0	2	0	0	6	1	0	0	4	2	26
	Administrative Arrangements	0	0	0	2	3	2	2	2	2	7	4	1	4	1	7	37
	Application Procedure	4	4	1	1	0	1	4	6	4	2	6	4	1	1	1	40
	Criteria for Advancement	7	6	1	1	1	1	6	1	1	7	4	3	4	1	4	48
	BDA Role	3	5	3	0	3	6	2	10	12	6	8	10	12	4	3	87
	Control	6	6	2	1	3	4	0	2	6	1	2	3	6	2	2	46
	Decision-Making Panels	1	4	2	2	0	3	3	1	3	4	0	0	0	2	8	33
	Decision-Making Procedure	6	4	4	2	3	4	4	4	14	0	1	4	6	3	15	74
	Difficulties	0	8	1	2	4	1	2	2	0	6	1	2	2	3	0	34
	Ending the Scheme	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	3
	Feedback from Applicants	1	2	1	0	3	4	0	1	1	0	0	3	1	0	1	18
	Involvement in Implementation	1	0	0	0	0	3	3	6	4	4	1	4	1	2	2	31
	Marketing	3	7	3	1	1	0	3	4	3	12	3	2	1	3	4	50
	Other Activities	1	0	0	0	0	1	0	1	0	1	3	2	1	0	1	11
Descriptions	Prior Experience in Implementation	0	0	2	0	3	0	1	2	3	4	0	1	1	1	0	18

	Qualifying Activities	2	2	1	0	2	1	0	3	2	3	1	1	1	1	1	21
	Rationale I	9	10	0	0	4	7	2	6	7	6	0	4	2	4	6	67
	Reason for Involvement in Implementation	0	0	1	0	0	0	0	2	4	1	0	1	5	1	1	16
	Relationships	2	3	4	0	4	1	2	4	7	11	2	3	4	7	6	60
	Type of Applicants	1	9	6	1	2	3	1	2	1	4	0	2	0	0	4	36
Evaluations	Alternatives to APOC	0	0	0	0	0	0	0	0	0	2	2	2	0	2	6	14
	Application Procedure Successes	2	0	2	2	1	0	1	2	3	0	0	0	1	0	0	14
	Failures	2	2	0	1	1	1	1	0	0	2	0	0	0	1	1	12
	Learning Achieved	2	2	3	2	4	2	0	1	3	4	0	1	1	1	1	27
	Marketing Success	0	0	0	1	0	1	0	0	2	0	3	0	1	2	2	12
	Measures of Success	0	1	1	1	2	0	0	1	0	0	0	0	0	2	1	9
	Outcome Successes	5	3	5	3	3	6	2	1	2	4	2	2	1	3	0	42
	Problems with Previous Schemes	1	0	0	2	1	5	0	1	1	4	2	2	2	1	1	23
	Quality of Applicants	1	0	1	1	0	2	0	0	5	3	1	0	4	1	1	20
	Value Added by APOC	2	2	8	2	3	1	0	6	4	8	0	4	3	4	2	49
Explanations	Causes of Added Value	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
	Causes of Application Successes	2	0	3	0	2	0	1	1	0	0	0	0	2	0	0	11

	Causes of Bid Success	2	0	0	2	0	0	0	0	0	0	0	0	0	3	0	7
	Causes of Failures	6	0	0	0	1	0	1	0	0	0	0	0	1	1	1	11
	Causes of Learning Achieved	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Causes of Marketing Outcomes	4	0	1	0	1	2	0	1	0	5	3	1	3	2	1	24
	Causes of Outcome Successes	9	0	2	1	2	2	0	2	0	8	1	1	3	5	3	39
Interpretations	Development Decisions	3	1	0	0	0	0	1	1	3	2	2	1	0	2	2	18
	Exclusivity	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4
	Modifications	2	1	1	0	2	1	1	1	1	2	2	1	2	1	2	20
	Role of ERDF	0	0	1	1	1	4	0	2	3	4	4	1	5	1	4	31
	Scheme Strengths	0	0	4	0	2	0	0	4	7	3	1	4	6	7	0	38
	Scheme Weaknesses	0	0	2	0	2	0	0	2	2	1	0	3	3	1	0	16
	Number of Codings	139	130	80	58	82	112	47	98	127	156	60	86	102	104	105	1486

Appendix 7 – Node x Enterprise Table

	Enterprise Node	E01	E02	E03	E04	E05	E06	E07	E08	E09	E10	E11	E12	E13	E14	E15	E16	E17
Descriptions	APOC II Development	2	2	7	0	5	0	5	2	1	5	2	3	6	0	3	0	2
	Actual Outcomes	9	0	0	5	0	0	0	2	6	5	2	3	3	5	5	4	3
	Administrative Arrangements	1	3	2	0	2	0	1	0	1	0	2	3	3	3	2	2	2
	Alternatives to APoC	0	0	0	1	5	1	0	4	4	2	4	2	3	3	2	1	2
	Applicant Characteristics	0	0	0	0	0	0	4	1	0	1	1	0	0	0	0	0	0
	Application Procedure	3	0	0	0	2	0	0	7	0	3	1	3	2	5	4	2	1
	Criteria for Advancement	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
	BDA Role	2	1	2	0	1	0	0	3	1	0	0	1	1	2	0	1	0
	Commercialisation Stages	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0
	Decision-Making Panels	0	0	2	0	1	0	0	3	0	0	0	0	0	0	0	0	0
	Difficulties	1	0	0	0	2	3	0	3	0	0	4	7	2	4	0	1	0
	Ending the Scheme	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feelings on Hearing the Outcome of Application	0	0	0	0	0	0	0	0	2	2	0	1	1	0	0	2	1
	Final Outcome	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	5

	Initial Contact	1	1	4	1	1	1	2	0	2	1	1	2	1	1	2	2	1
	Managerial Issues	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Non-grant Funding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Plans for using APoC	0	0	0	0	0	0	0	7	2	1	2	3	2	1	2	2	4
	Purpose of APoC	1	3	4	2	2	0	1	1	0	0	4	1	2	1	1	1	3
	Qualifying Activities	7	4	4	7	8	6	7	0	6	4	5	4	8	4	4	6	5
Evaluations	Failures	1	2	1	3	0	0	0	2	0	0	0	2	0	3	0	0	0
	Help and Support	3	4	6	2	8	8	4	3	13	6	3	5	1	6	8	4	7
	Learning Achieved	1	5	0	0	0	0	0	0	1	2	0	2	0	1	0	1	0
	Obstacles	2	1	6	7	4	0	1	3	5	3	0	8	4	0	1	1	3
	Outcome Successes	0	3	0	3	0	0	0	0	0	1	0	1	1	0	0	0	0
	Recommendations for Support Services	0	1	3	5	7	2	2	9	4	2	1	0	7	3	9	4	5
	Value Added by APOC	2	2	0	2	1	0	2	1	4	2	4	3	4	4	3	1	5
	Causes of Added Value	0	2	0	0	0	0	0	1	3	0	4	1	6	1	2	1	1
	Causes of Application Successes	0	0	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0
na	Causes of Failures (APoC)	1	0	0	2	0	0	2	0	0	0	1	3	1	3	0	1	0

	Causes of Failures (Non-APoC)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Causes of Learning Achieved	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Causes of Outcome Successes	1	1	1	1	1	0	0	2	0	0	0	1	0	0	0	0	0
	Grant versus Loan	0	0	0	2	0	0	1	0	2	1	2	1	0	2	1	1	1
	Influences on Decisions	0	0	2	3	2	0	2	6	0	1	7	1	3	2	7	2	5
	Justification	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Network	5	2	2	3	3	0	1	1	1	3	0	0	3	9	3	1	6
	Personal Aims	3	0	0	3	2	1	0	1	1	0	1	2	1	0	2	1	0
	Rationale for Applying	4	0	3	2	5	2	1	7	2	0	1	3	3	4	3	2	2
	Role of Government	0	3	1	3	1	1	4	10	3	2	2	0	2	4	3	2	5
	Scope of Influences on the Business	0	0	0	0	1	0	1	0	0	2	0	1	2	0	0	1	1
	Serendipity	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1
	Advice Offered	0	0	3	2	3	0	1	5	2	3	2	0	2	2	3	4	0
etation	APoC Target Market	0	1	0	0	1	0	1	1	0	0	2	0	0	0	0	0	0
	Changed Plans	0	0	0	2	2	0	1	1	2	3	1	4	2	4	1	2	2

	Development Decisions	0	0	0	0	3	1	1	0	0	0	2	0	2	0	3	1	1
	Exclusivity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Future Support Needs for Innovators or Entrepreneurs	0	0	0	2	1	1	0	1	1	0	1	0	0	1	1	0	0
	Help Needed	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
	Meaning of Evaluation	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
	Meaning of Proof of Concept	0	0	0	0	0	1	1	3	1	3	2	2	2	3	6	1	1
	Modifications	1	0	2	0	4	0	1	0	0	1	1	2	3	1	0	0	1
	Public Perception (of inventors)	0	1	1	3	2	0	2	1	0	0	1	0	1	0	0	0	0
	Reactions	0	1	1	2	3	0	0	4	0	1	0	0	0	0	0	0	0
	Role of ERDF	0	2	0	0	1	0	0	0	0	0	2	1	0	0	0	0	0
	Scheme Strengths	0	1	1	0	2	0	1	0	2	1	4	3	4	3	0	1	2
	Scheme Weaknesses	1	0	0	0	1	0	2	0	2	1	4	3	3	0	1	1	1
	Number of Codings	54	46	61	68	88	29	52	97	75	63	83	82	92	90	83	60	79

		E18	E19	E20	E21	E22	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32	E33	No. of Coded Ref.
Descriptions	APOC II Development	5	5	4	3	4	3	2	2	3	2	1	9	2	4	0	5	99
	Actual Outcomes	3	1	4	0	2	6	2	3	4	4	1	5	4	0	4	10	105
	Administrative Arrangements	1	2	1	2	2	2	2	0	4	3	0	3	1	5	4	3	62
	Alternatives to APoC	1	4	3	2	0	3	0	0	1	2	0	0	2	6	3	4	65
	Applicant Characteristics	0	2	0	0	0	0	2	2	1	0	0	0	0	1	1	0	16
	Application Procedure	0	3	1	4	2	2	2	0	4	1	0	3	3	2	4	1	65
	Criteria for Advancement	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	BDA Role	2	2	1	2	2	0	0	0	0	0	0	1	0	0	1	0	26
	Commercialisation Stages	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	8
	Decision-Making Panels	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	8
	Difficulties	4	1	7	4	1	3	2	1	0	1	2	4	1	1	0	0	59
	Ending the Scheme	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Feelings on Hearing the Outcome of Application	2	0	1	2	0	1	0	2	0	1	2	1	3	2	2	0	28
	Final Outcome	2	3	3	4	4	3	2	2	2	1	0	2	1	0	1	4	45

	Initial Contact	1	1	2	1	2	2	3	1	4	2	1	3	2	1	1	1	52
	Managerial Issues	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	0	5
	Non-grant Funding	0	0	0	0	0	0	2	2	3	0	0	2	0	3	3	5	20
	Plans for using APoC	2	3	3	2	4	3	1	3	2	3	1	4	2	3	2	4	68
	Purpose of APoC	0	1	0	1	1	2	1	1	1	0	0	1	0	0	1	0	37
	Qualifying Activities	4	6	1	1	5	1	0	3	2	2	4	5	7	6	4	9	149
Evaluations	Failures	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	19
	Help and Support	10	1	6	4	7	7	7	5	4	4	5	8	11	7	3	9	189
	Learning Achieved	2	1	1	4	2	0	0	2	0	2	0	0	9	0	0	1	37
	Obstacles	3	0	11	3	5	1	4	3	6	3	3	8	9	1	1	3	113
	Outcome Successes	0	0	1	1	1	1	1	0	2	0	0	0	0	0	0	0	16
	Recommendations for Support Services	1	2	3	11	2	9	4	2	6	2	2	9	4	14	2	5	142
	Value Added by APOC	3	2	0	2	3	5	4	2	3	4	2	4	4	5	3	8	94
	Causes of Added Value	0	1	1	0	0	1	0	4	2	1	2	1	2	2	0	1	40
	Causes of Application Successes	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5
	Causes of Failures (APoC)	0	1	5	7	3	1	0	1	0	0	0	1	0	0	0	0	33

Explanations	Causes of Failures (Non-APoC)	0	0	0	0	0	0	5	5	3	1	0	2	0	0	0	0	16
	Causes of Learning Achieved	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
	Causes of Outcome Successes	0	0	1	0	0	3	1	5	3	2	0	1	0	0	0	0	24
	Grant versus Loan	2	0	1	1	1	2	1	1	2	1	3	2	1	3	2	1	38
	Influences on Decisions	2	1	4	2	5	4	2	2	7	7	1	3	1	3	1	4	92
	Justification	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	4
	Network	2	4	3	4	3	3	2	2	2	2	3	1	3	4	2	3	86
	Personal Aims	4	2	1	0	3	0	4	1	0	0	1	0	1	0	3	0	38
	Rationale for Applying	5	2	2	2	4	5	1	3	3	5	1	2	1	1	1	3	85
	Role of Government	0	1	4	3	3	2	2	1	6	0	2	4	1	4	3	5	87
	Scope of Influences on the Business	0	0	0	0	1	1	1	1	0	1	1	0	1	1	1	1	19
	Serendipity	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	8

Interpretations	Advice Offered	0	0	1	2	7	3	6	2	4	6	7	9	4	5	2	2	92
	APoC Target Market	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	8
	Changed Plans	4	1	3	0	2	1	6	2	4	2	1	1	2	4	0	2	62
	Development Decisions	1	0	2	1	4	3	1	2	6	6	1	3	2	3	1	4	54
	Exclusivity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Future Support Needs for Innovators or Entrepreneurs	0	0	1	1	2	1	0	0	4	0	0	0	0	0	0	0	18
	Help Needed	0	0	3	1	6	2	0	2	0	0	1	2	4	0	1	0	24
	Meaning of Evaluation	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	Meaning of Proof of Concept	1	0	0	1	1	2	0	1	2	1	1	2	2	8	2	1	51
	Modifications	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	22
	Public Perception (of inventors)	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	15
	Reactions	0	0	1	0	3	0	0	0	0	1	0	0	0	0	0	0	17
	Role of ERDF	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	7
	Scheme Strengths	3	4	3	1	2	4	4	2	3	4	1	3	2	3	6	4	74
	Scheme Weaknesses	4	2	3	0	2	5	1	1	3	1	0	7	1	4	2	4	60
	Number of Codings	74	62	94	82	103	98	83	78	112	78	53	117	93	110	68	109	2616

Appendix 8 – Example of Coding

Extract from verbatim transcript

I – And we talked in terms of timing before that the window of opportunity. Was APoC fast enough in taking the enquiry and getting it though to, to grant?

SM09 – Well obviously from the start, because it had a slow start, if you were asking a company they would say, no, but once we actually saw, I don't know how long it took the BDA, I don't know how long they were working with the company before they came to panel, but once it came to panel if it was approved, or approved subject to a few questions, I think it went through quite quickly. As quick as a bank anyway, and let's face it it's a grant, it's not a loan, they're not giving it back, so. The other thing as well with it is once the panel approved the concept we would have from that date of that panel when the company could start spending. So, okay, they doing it at a risk because they haven't had a letter, but they could actually start spending the money…..

I – Yeah.

SM09 – …..running in parallel with the offer letter and the contract and whatever coming out, the grant offer letter. So I don't think it did stop them, because as soon as they knew they could then start spending. So…..

Material coded to Descriptive Code – "Timing"

because it had a slow start, if you were asking a company they would say, no, but once we actually saw, I don't know how long it took the BDA, I don't know how long they were working with the company before they came to panel, but once it came to panel if it was approved, or approved subject to a few questions, I think it went through quite quickly. As quick as a bank anyway, and let's face it it's a grant, it's not a loan, they're not giving it back, so. The other thing as well with it is once the panel approved the concept we would have from that date of that panel when the company could start spending. So, okay, they doing it at a risk because they haven't had a letter, but they could actually start spending the money…..

…..running in parallel with the offer letter and the contract and whatever coming out, the grant offer letter. So I don't think it did stop them, because as soon as they knew they could then start spending.

Material Coded to Interpretive Code – "Progress of Application"

it had a slow start

I don't know how long it took the BDA, I don't know how long they were working with the company before they came to panel, but once it came to panel if it was approved, or approved subject to a few questions,

once the panel approved the concept we would have from that date of that panel when the company could start spending

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Material Coded to Evaluatory Code – "Pace of Application Development"

if you were asking a company they would say, no,

I think it went through quite quickly.

As quick as a bank anyway

once the panel approved the concept we would have from that date of that panel when the company could start spending.

the offer letter and the contract and whatever coming out, the grant offer letter.

Material Coded to Explanatory Code – "Causes of Pace"

it had a slow start

approved subject to a few questions

let's face it it's a grant, it's not a loan, they're not giving it back, so.

I don't think it did stop them, because as soon as they knew they could then start spending.

Appendix 9 – Field Notes

Interview E06 10th May 2012 10.03hrs

Interview taking place in a private house on an ordinary housing estate. Clearly the family home of the interviewee. Dressed in casual clothes and does not give a 'business-like' impression. Both landline and mobile telephone ring during the interview and calls taken.

Interviewee welcoming, but at pains to point out that they were not directly associated with the decision to approach APoC and was presented with a *fait accompli* by a consultant. Gives a negative attitude, but took great delight in showing me prototype products kept in family garage – manufacture takes place but appears to be at a sub-contractor.

Speaks clearly and calmly but expresses discontentment because business really wanted practical help. Defensive over prospect of using grant to bring in sub-contractors, yet already willing to engage with a manufacturer – claims grant is not sustainable and couldn't last long enough to be worthwhile.

Acknowledges business failing and points out three major shortcomings. Later, emerges that there are disagreements amongst partners about how to proceed.

Reasons for rejection of application seem obvious and not surprising.

No particular features or characteristics to note. Straightforward, but interviewee obviously not sufficiently connected with proposal to comment authoritively.

Appendix 10 Memoing

18/02/2012 20:23hrs

In interview SM01 the respondent does not actually say who designed the parameters that would become the targets to be met by companies submitting a tender to manage APOC. It is said that [name of agency] articulated the parameters, but this is not the same as indicating that they created or laid down the parameters. It's not clear if in was actually decided at a level above [name of agency] or whether it was the [name of Government Department] people who set out the specification. Really, the key issue is whether this was a regional example of something that was to be promoted at National level with permitted regional variations with [name of agency] deciding what those regional variations should be.

The interview with SM04 provided more clarity indicating that the process was a standard process used reasonably frequently and following established protocols. However, this does not make it clear how the parameters were identified and embodied in the KPIs (Key Performance Indicators). It appears that from wherever the KPIs arose, they were regarded as sacrosanct and there is no indication of variable depending upon who was selected to manage APoC. Of course, at the time of interview, this was an historical statement and is probably conditioned by knowledge of the actual appointment.

The interview with SM06 suggests that there was a group of several 'interested' parties who drew up the tender and the tender process and it is inferred, but not stated, that the grouping determined the parameters. What is also not clear is how that grouping was appointed/selected and whether any were closely associated with institutions who subsequently tendered.

Other interviewees indicate that they were not sufficiently closely connected to the process to be able to comment.